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5 SEPTEMBER 1986

USSR Report

SCIENCE AND TECHNOLOGY POLICY

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ORGANIZATION, PLANNING AND COORDINATION

GENERAL PROBLEMS OF ACCELERATING S&T PROGRESS VIEWED

Kiev KOMMUNIST UKRAINY in Russian No 2, Feb 86 pp 14-24

[Article by A.P. Savchenko: "Scientific and Technical Progress: Some Questions of Acceleration"]

[Text] The 12th Five-Year Plan--the most important stage in the implementation of the economic strategy of the party and the concept, which was formulated by the April (1985) CPSU Central Committee Plenum, of the rapid socioeconomic development of the country on the basis of scientific and technical progress--has started. During the 5-year period such a pace, which would ensure the achievement of the high levels which are outlined in the drafts of the new version of the CPSU Program and the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000, has to be attained in the entire national economy.

The accomplishment of this task requires the further improvement of the management of the national economy and the urgent reorientation of the entire economic mechanism toward the acceleration of the progress of science and technology. As Comrade M.S. Gorbachev emphasized at last year's June conference in the CPSU Central Committee, it is a question first of all of the creation of a comprehensive system of the strategic planning and forecasting of the unified process of the development of production, science, engineering, and technology and of the maximum possible integration of plans and interests at all levels of management and administration. And the reform, or rather the readjustment, of the economic mechanism should ensure the replacement of the existing formal mandatory approach to questions of the elaboration and introduction of the results of scientific and technical progress by an interested approach, which is based on economic and social stimuli which correspond to the present conditions of economic development and the nature of the tasks being accomplished.

In this connection a number of interconnected problems, which require joint solution, are being placed on the agenda. Their essence consists in ensuring in practice the integration of the plan of production and scientific and technical progress, the increase of the scale of the renovation and retooling of the national economy on the latest scientific and technical basis, the utmost increase of the efficiency of the use of the already created scientific potential, and the increase of its influence on the speeding up of the

changeover of the economy to the intensive means of development. Here, too, it is advisable, on the basis of the requirements of the precongress documents, to touch upon several aspects of the problem and to attempt to determine the practical scientific possibilities and means of settling the named questions.

The Integration of the Plans of Production and Scientific Progress

As is known, the existing practice of planning does not ensure the necessary unity of the plans of the development of production and scientific and technical progress. The prevailing methods of drafting current, five-year, and long-range plans of economic and social development at all levels devote priority attention to the substantiation of the numerous indicators which constitute the basis of the evaluation of the results of the activity of the object of management. The set of indicators of the development of scientific and technical progress forms organizationally an independent section of the plan, the essence of which, unfortunately, reduces merely to a list of both important and insignificant measures on the introduction of new equipment. And although attempts at the calculation of the economic efficiency of each such specific measure are being made, their overall effectiveness is not being evaluated.

As a result the indicators of this section proved to be completely divorced from the other indicators of the plan of the development of production, including the final indicators, which determine the overall effectiveness of production operations. Apparently, one of the defects in the planning mechanism of management, which in practice has the result that scientific and technical progress, figuratively speaking, is not yet working at full strength for the intensification of the economy, also lies precisely here.

Meanwhile the available experience attests that in the settlement of this important question there are many possibilities for the display of initiative, first of all on the part of economists and planning organs. For example, the Ukrainian SSR State Planning Committee during the 11th Five-Year Plan carried out studies on the evaluation of the effect of scientific and technical progress on labor productivity and the production cost of the output being produced, having included them in the national economic plan of the republic. And this, it can be said without exaggeration, played a significant role in the fact that the results of the past five-year plan with respect to these and many other technical and economic indicators proved to be greater than the plan assignments.

First of all it was possible to overcome the negative tendency, which had survived for many years, for the materials intensiveness of production to increase and even to decrease it by 3.4 percent as against 1.9 percent according to the five-year plan. By means of this factor alone nearly 2 billion rubles of national income were additionally derived, while as a whole this most important generalizing indicator of the efficiency of social production during the past five-year plan increased on the average in a year 1.4-fold more rapidly than during the 10th Five-Year Plan. The following fact attests that the acceleration of scientific and technical progress is the

basis for this process: the entire increase of the national income was obtained due to the increase of labor productivity.

Naturally, this is merely the beginning of the large amount of work on the improvement of the mechanism of management, which has to be accomplished during the 12th Five-Year Plan in conformity with the Basic Directions. But it is now already obvious that this work should begin namely with the plan, with the elaboration and introduction into planning practice of a set of interconnected indicators, which prompt production to the large-scale use of major and effective scientific and technical developments and the scientific research potential to the rapid creation of such developments. For this, of course, one should have the necessary planning tools and determine the specific indicators of the plan, moreover, it is possible to base the methods and principles of their formation on the following conditions.

First. The inclusion of one result or another of scientific and technical developments in the plan should be preceded by the procedurally precise and objective measurement of the real economic impact, which has to be ensured at the works as a result of their introduction. The specification in the plan of the quantitative influence of the measure being introduced on the growth of labor productivity and the increase of quality and reliability in case of the decrease of the power-output and materials-output ratio of the products being produced should become mandatory here. Such calculations can be made already today, planning organs of all levels of management are entirely capable of their practical realization.

Second. The ultimate indicators of the effectiveness of technical progress should be appended to the production program, that is, be objectively taken into account quantitatively and qualitatively in the plan of the material, technical, and resource supply of the given volume of introduction of its achievements. This most important portion of the preplanning calculations should be performed at the enterprise, in the association, and in the sector and be checked at planning organs with particular care, since it is a matter of the creation of the material base of future production, which is actually balanced with respect to the future resource expenditures and the anticipated production economic results. For this in the corresponding sections of the plan it is possible and necessary to specify the sources and amounts of financing of the introduction of scientific and technical innovations and the provision of the proposed operations with machinery, equipment, materials, and other means in the necessary quantities.

The third decisive condition is the integration of the interests of the enterprise (sector) and state in the comprehensive plan of the development of production. Such integration should not only be based on the unconditional self-sufficiency of scientific and technical progress, but also envisage its mutual profitability. Such a situation, when the ultimate economic impact, which is obtained at the enterprise or in the sector as a whole due to scientific and technical progress, will be divided on a parity basis between the enterprise and the state budget, creating mutual economic interest, seems acceptable. Moreover, depending on the scale and national economic importance of the scientific and technical innovation being introduced, the obtained

impact can be distributed between the enterprise and the state in different ratios, but with the mandatory priority of statewide interests.

It is very important that the amount of the ultimate impact, which has been obtained from the introduction of something new and has been left at the enterprise, would actually be at its full disposal without any attempts at confiscation subsequently, as still frequently happens at present. Then the real opportunity will appear to strengthen in practice the socialist principle of payment according to labor: whoever works better (the production collective and its members) also receives more (both from the wage fund and from the funds of the enterprise).

Without this, as numerous experiments have shown, it will be difficult to achieve a radical, multiple increase of labor productivity. Of course, the further broadening of the independence and rights of enterprises in the area of the formation of the organizational staff structures, effective maneuvering in the remuneration of labor, and the placement and use of personnel is required here. For this purpose one should take the path of the resolute rejection of the obviously obsolete standard documents, which regulate the remuneration of labor, the job and wage rates classification manuals, which have lost touch with life, and numerous instructions, which paralyze initiative and truly socialist enterprise. Concern and initiative in the implementation of such solutions should be displayed on the part of both state planning and state financial organs.

However paradoxical this will seem at first glance, the main restraining factors in the increase of the role of the state plan in the acceleration of scientific and technical progress lie today in the uncoordinated activity of such important institutions of management as the USSR State Committee for Science and Technology (GKNT) and the USSR State Planning Committee. Indeed, when drafting strategic plans and forecasts of the development of science and technology, the USSR State Committee for Science and Technology clearly orients them toward the solution of important intersectorial, general economic problems of the intensification of the national economy. However, when it comes to the drawing up of current plans, here the position changes drastically in the direction of the preferential observance of the interests of sectorial ministries and departments, since the latter have the sources of financing and the basic resources, while by virtue of this in practice determine the folio of orders for science and technology. The State Planning Committee, in turn, uses the suggestions of the USSR State Committee for Science and Technology on the acceleration of scientific and technical progress only as recommended, and by no means mandatory guidelines in the plan, which do not have resource backing and a clearly specified economic effectiveness.

The problems, to which such a one-sided approach to the accomplishment of the tasks of the acceleration of scientific and technical progress gives rise, have been covered extensively in the press. And, therefore, here I would like to direct attention to just two things.

First, the goal orientation of the activity of the USSR State Committee for Science and Technology and its role, place, and functions in the management of

the progress of science and technology need specification. As was noted at the June (1985) conference in the CPSU Central Committee, it is necessary to focus the activity of the USSR State Committee for Science and Technology more clearly on the elaboration of strategic plans and the long-term directions of the development of scientific and technical progress with allowance made for world experience and to aim it more actively at the search for new approaches to the intensification of the economy and the further improvement of the mechanism of the acceleration of the progress of science and technology. This committee, obviously, should also not duplicate the USSR Academy of Sciences and the academies of sciences of the union republics in the area of the organization and coordination of basic research and the conducting of applied scientific development, as well as perform individual functions of the State Planning Committee on the drafting of plans of the economic and social development of the national economy. Given such an approach the USSR State Committee for Science and Technology will become a well-defined and effective unit in the state system of the management of scientific and technical progress, an equal partner of the State Planning Committee in the drafting of plans, and a coordinating and managing center for ministries and departments, which is also necessary for the solution of the arising problems.

Second, it is also advisable, in our opinion, to broaden somewhat the functions of the State Planning Committee and to consolidate organizationally the subdivisions of it, which deal with questions of the planning of scientific and technical progress. Their activity should be reoriented toward the purposeful systems search for the results of scientific and technical solutions in the form of new machines, equipment, technologies, and so on, which in a priority and mandatory manner are liable to inclusion in the plan for subsequent introduction at specific, predetermined facilities.

Here it is appropriate once again to cite the experience of the Ukrainian SSR State Planning Committee, in which back during the 10th Five-Year Plan on the recommendations of the Ukrainian CP Central Committee and the Ukrainian SSR Council of Ministers special subdivisions for the planning of scientific and technical progress were established, which made it possible to raise all this work to a higher level and to strengthen and develop the use of goal program methods of the management of the progress of science and technology in the republic. These methods have been embodied in republic, sectorial, and regional scientific and technical comprehensive goal programs, which are becoming more and more widespread. Such programs make it possible to concentrate resources and to direct the scientific production potential more efficiently at the solution of specific problems in the priority directions and, as the analysis of their use shows, ensure the rapid and effective achievement of the goal.

For example, during the years of the 11th Five-Year Plan scientific and technical measures with a total economic impact, which exceeds 1.2 billion rubles a year, were introduced in production owing just to the implementation of the assignments of three republic programs--the Energy Complex, Metal, and the Materials-Output Ratio. As a whole during this period the economic impact from the introduction of developments of scientists of the republic in the national economy of the country increased appreciably and exceeded in terms of the last year of the past five-year plan 3 billion rubles.

At the same time the experience of improving the planned management of the development of scientific and technical progress, which exists in the republic, shows that goal programs, even ones which have been formulated in the best manner, will by no means replace the plan. They were and will remain an auxiliary tool, which merely increases the influence on production of the economic mechanism and the methods of economic interest, which were incorporated when formulating the plans of the production operations of the enterprise or sector. Moreover, in practice the formulation of scientific and technical programs is frequently carried out formally, the direct duplication of sections of the plan is permitted, the ultimate goals and tasks are not clearly formulated. This decreases the effectiveness of the programs and turns them into a formal appendage of the plan, and not into a qualitatively new and effective complement of it. In this case the importance of goal program methods of planning and management depreciates, while the programs themselves become another, moreover, far from effective, organizational unit, which functions as a voluntary service, does not interest anyone in anything, and does not oblige anyone to anything. Such a situation formed, for example, at the first stage of the formulation of the republic program Labor, which during implementation was substantially revised and supplemented with specific scientific and technical measures, which provided in the long run in the sphere of physical production the saving of the labor of 4 million people.

It seems that the proposed changes and improvements in the planning of the development of production and scientific and technical progress can be made during the drafting of the annual plans of the 12th Five-Year Plan and the plans for the more distant future at both the all-union and republic levels.

The Renovation and Retooling of the National Economy

At present this problem is being examined and solved mainly from a sectorial standpoint, a national economic planning approach to carrying out the renovation and retooling of production has not yet been developed. Moreover, contracting construction organizations so far are more interested in new construction and agree extremely reluctantly to the performance of work on the renovation and retooling of operating works. As a result these operations are being drawn out exceedingly in time, which is leading to significant economic losses. Considerable assets and resources are being frozen, the rhythm of operating production is being upset (frequently with a loss of volumes), and, what is the main thing, the equipment and technologies, which are being used for renovation, during this time become obsolete and, in the end, do not yield the anticipated impact.

Meanwhile in the Ukrainian SSR, for example, the growth rate of labor productivity at renovated enterprises during the 11th Five-Year Plan led by more than threefold the growth rate achieved on the whole for industry. Renovation yielded a large economic impact at the Southern Mining and Ore Dressing Combine in Krivoy Rog, in the Kiyevtorgmash Association, at the Novokramatorskiy Machine Building Plant, at the Dnepropetrovsk Combine Plant, and at a number of other enterprises. However, it is no secret that effective measures on renovation have not yet become a mass phenomenon, and they are

often implemented only due to the enthusiasm of managers and party organizations.

Economists, scientists, and experienced workers have to do much to give these operations a planned state orientation. In our opinion, first of all it is necessary to clearly find one's position in the very understanding of the renovation and retooling of production so that the assets and resources, which are being allocated for these purposes, would not be used for repair needs and for the keeping of worn out production capacities in operating condition. Here the clear specification of the efficiency function seems most correct: renovation and retooling should support the process of expand reproduction on a new scientific and technical basis. In all other instances, when as a result of the taken steps, regardless of the sources of their financing, only simple reproduction is ensured, it is advisable to attribute all the outlays to the repair and operating expenses, which are called upon to restore or support the initial level of the production capacities.

However, it happens this way far from always, which significantly narrows the framework of renovation and retooling proper, while a portion of the capital investments, which are allocated for their implementation, is frequently used not for the immediate purpose. In order to avoid this, apparently, the strict monitoring on the part of ministries and departments, as well as financial organs of the clearly delimited use of the assets and resources, which are being allocated for new construction, renovation and retooling, and the keeping of production capacities in working order, should be established.

As to the choice of the priority directions of renovation and retooling, they have already been specified by the formed state of the material base of social production and by the qualitative structure of modern fixed production capital. A number of recent decrees of the party and government, the Energy Program, and the draft of the Basic Directions are precisely the basic documents, by which the priority of retooling on the basis of scientific and technical progress has been given namely to the base sectors which determine the technical progress of the entire national economy.

Several other questions of the acceleration of this type of operations also require settlement. Given the present scale and rate of development of scientific and technical progress, apparently, an operating period of 30-40 and even 20 years can no longer be acceptable, since in this time production capacities and equipment not only wear out, but also become completely obsolete. It would be correct and economically justified, if the plan envisaged the renovation and retooling of production in complete conformity with the step of scientific and technical progress in the specific sector, which in recent times has not exceeded 10 years.

This, of course, will require the revision of the standards of amortization deductions, which already now is also being done, the parameters of the product cost, and several other economic indicators, which characterize the production operations of the enterprise. It seems that here one should not be afraid of the possible increase of the production cost of the output being produced, but should try to see to it that the timely retooling of production on the basis of the latest achievements of scientific and technical progress

would envisage without fail (their meaning and importance lie in this) the increase of the production volumes, the decrease of the resource intensiveness, and the increase of the quality of items in amounts, which more than compensate for the possible increase of the production cost due to the increasing share of amortization deductions. The world experience of the industrially highly developed countries convincingly attests to the effectiveness of such rapid retooling of production. It is very important here, as recent party documents require, that the plans of the retooling, and especially the plans of the renovation of production in practice become the basis of the introduction, moreover, the comprehensive, large-scale, and rapid introduction, of the latest achievements of scientific and technical progress. Planning elements, that is, the set of economic indicators of the development of production on the basis of scientific and technical progress, which has been elaborated in the plan, should prompt ministries and departments to this.

The very renovation and retooling of production should be accomplished, as a rule, on the basis of domestic scientific and technical developments, be it technological lines and complexes, units, machines, or equipment. Experience shows that the purchase of expensive foreign technologies and equipment frequently proves to be economically unjustified and solves only temporarily the problem of the development of production. Imported technology during operation requires spare parts and assemblies, and frequently also special components of raw materials, materials, and accessories, which it is necessary to purchase in addition or whose custom production it is necessary to organize locally. Such lines and machines frequently do not blend fundamentally with the technologies of domestic production, lead to breaks in the chain of the mechanization and automation of processes, cause additional expenditures, and, what is of no little importance, make the development of domestic production economically dependent on capitalist firms, as has already happened in recent years.

In order to prevent this, the adoption and use of world scientific and technical achievements should be developed and improved at the level of the exchange of ideas, as well as by the purchase of licenses for the production of new equipment, and not the very equipment and technologies. In this matter it is necessary to establish strict state order and control, which today is frequently replaced by sectorial interests, in spite of the existence of a single state unit for purchases of imported equipment. Apparently, it would be advisable to assign the final settlement of questions of the importing of equipment and technologies to the State Committee for Science and Technology and the USSR State Planning Committee as the main and most competent state organs in the system of the management of scientific and technical progress.

On the other hand, it would also be worthwhile for these organs to examine closely the established practice of selling abroad licenses for the production of domestic advanced technologies, materials, machines, equipment, and instruments. Now the sale of licenses to foreign firms, even in spite of the fact that the scientific and technical innovations, which are protected by them, have not yet found practical embodiment in domestic production, has become all but the main criterion of the effectiveness of the work of scientific research and planning and design organizations. If you consider thoroughly the essence of such a phenomenon, the sale of licenses in this case

is nothing but trade in the knowledge and intellect of scientists and specialists, which weakens the domestic scientific production potential.

The questions of the development of scientific, technical, and economic relations were thoroughly substantiated in the speech of Comrade M.S. Gorbachev at a meeting with representatives of the U.S./USSR Trade and Economic Council in December 1985. There is no doubt that the State Committee for Science and Technology, the State Planning Committee, and the USSR Academy of Sciences will draw the proper conclusions and make the appropriate decisions, which are aimed at the serious improvement of the entire arrangement of our interrelations with partners in the importing and exporting of the results of scientific and technical progress.

The Increase of the Efficiency of the Use of the Scientific Potential

The interconnected planning of the development of production and scientific and technical progress naturally dictates the need for the increase of the efficiency of the use of the created scientific potential and the assurance of greater effectiveness in the work of scientific research and planning and design organizations. The task here is to create a more perfect mechanism of management, which literally forces all the components of the scientific potential to work for the acceleration of scientific and technical progress, to stimulate creative research, and to strengthen in every possible way the relations of science with production. It is possible to achieve this first of all through the broadening of the market of scientific and design developments, which are ready for introduction, so that the demand on the part of production for the results of scientific and technical progress would be met with room to spare by the proposals, which are ready for introduction, of the domestic scientific potential, which by right holds leading positions in the world.

Today the criteria of the evaluation of the activity of research, planning, and design organizations, regardless of departmental affiliation, as is known, are formulated very vaguely and indefinitely. The majority of them, as the analysis shows, are oriented toward the assurance of the efficiency of their own activity, and not toward the obtaining of a national economic impact. So far state statistical reporting (that is, the state monitoring of their work) is also disposed to this. When obtaining for the plan of work state budget or sectorial, so-called cost accounting (although these are in the end the same state assets) allocations, scientific research institutes and design bureaus can report back on their work with results, which do not oblige them to anything and do not yield either the state or the sector a real income.

Apparently, such a practice in the future should not occur. It would be correct if the planning mechanism of management envisaged that the development and introduction of scientific and technical achievements would also be changed over to self-financing. The opinion that real revenues both from the activity of scientific research institutes and from the introduction of the achievements of scientific and technical progress in production should come to the state budget in exactly the same way as today they come from the activity of the works themselves, will hardly arouse objection.

For this purpose, in our opinion, it is advisable to commission the State Committee for Science and Technology, the State Planning Committee, and the USSR Academy of Sciences to elaborate criteria, which satisfy the requirements of the times, of the evaluation of the activity of research and planning and design organizations and the procedure and regulations of their changeover to complete cost accounting. These organs should, in our opinion, be charged with the elaboration of a uniform concept for the country and a long-term policy of the development of science and specify the basic directions of the acceleration of scientific and technical progress as a part of the overall system of the intensification of the economy. The national economic order to science and the demands on the development of basic research and the elaboration of specific scientific and technical solutions, without which state assets for the development of scientific research would not be allocated to either sectorial or academic organizations and higher educational institutions, should also be formulated by the forces of these organs. It is no secret that the principle of the sectorial order to science, which predominates today, is one of the causes of the notorious work on minor themes, the unsatisfactory solution of many intersectorial problems of intensification, and the extremely slow development and introduction of new equipment and technologies.

The basic reason that many scientific research and planning and design organizations for years have been engaged in the development of minor improvements of operating equipment and technologies and the modification of individual assemblies and parts and have a very negligible proportion of reserve, promising research and development, in our opinion, lies precisely in this. As a consequence, many scientific research institutes and design bureaus are successfully creating the appearance of efficient work, although the period of introduction is increasing, the pace of the updating of the output being produced is decreasing, and the ultimate effectiveness of scientific and technical progress itself is worsening.

Obviously, it would also be advisable that a specific reserve of financial, material, and technical resources, which are necessary for the use of the competitive system in the development of important scientific and technical innovations, would be at the disposal of the USSR Council of Ministers. Here it can be organized under the supervision of the State Committee for Science and Technology and the USSR State Planning Committee on approximately the same principles as the competitions of architects, musicians, and other representatives of art. However, since large collectives, and not individual creators will participate in the competitions of scientific, technical, and design developments, the indicated reserves of financial and material resources are needed for the partial reimbursement of the expenditures of the competing collectives, whose developments for various reasons are not accepted for implementation.

One should also think about putting a similar competitive approach into practice when selecting the objects for the introduction of important scientific and technical achievements, giving preferences to the enterprises and organizations, which are best prepared organizationally for introduction, have a more developed production engineering base, and have highly skilled personnel. In other words, it is advisable to give preference in the

assimilation of the achievements of scientific and technical progress to whoever can ensure a quicker and greater economic impact from introduction. Apparently, it is not worth fearing that here small enterprises and works will be placed in a worse position. The gain in the overall acceleration of scientific and technical progress for the national economy, undoubtedly, will also create a more solid basis for the solution of the problems of the development of such enterprises. Of course, these suggestions are not indisputable, but the search for forms and methods of increasing the effectiveness of technical progress should be conducted on a broad front.

When speaking about the development of science as the basis of scientific and technical progress, it is necessary to examine specially the questions which concern basic research. Such research is concentrated, and this is entirely correct, in the system of the USSR Academy of Sciences and is financed from the state budget. However, the formation of the plan of expenditures for the Academy of Sciences for subsequent periods is carried out, unfortunately, on the basis of the same principles as the plans of the development of the sectors of the national economy, that is, from the previously achieved level. Moreover, it is well known that in recent years academic institutes and higher educational institutions of the country have begun to devote more attention to the obtaining of practical, applied results on the basis of basic research and development. While appraising this trend as a whole as positive and very effective, all the same it is necessary to note that applied development, and especially its practical scientific results, which have been brought up to the stage of introduction, requires enormous expenditures of time, assets, and resources. This is due to the fact that in the chain from the idea to the production prototype of new equipment expensive scientific and technical, planning and design, pilot experimental, and other purely production links, the assets and resources for the functioning of which, of course, are allocated to the detriment of basic research, inevitably appear. It is clear that this to a certain extent hinders the development of the latter, frequently paralyzes the possibilities and initiative of scientists in the development of the latest directions of science, and works by no means for the future.

Hence the need is arising to change the approach to the planning of basic research and to allocate assets for its development not from what has been achieved, but on the basis of the evaluation of the real need of the broadening of the front of operations in promising directions of modern knowledge, with allowance made for the future needs of socialist society. The planning of such research should be carried out jointly by the State Committee for Science and Technology and the State Planning Committee and be based on the above-mentioned unified concept of the development of science as the foundation of scientific and technical progress.

The problem of shortening the time and enlarging the scale of the introduction of the results of scientific and technical progress in production merits special attention. Here three basic interconnected problems require immediate solution. First, the significant shortening of the time lag from the idea to its embodiment in a prototype which is ready for introduction in production. Second, the shortening of the time of the very process of the introduction of an innovation in production and the acquiring of experience which makes it

possible to enlarge the scale of its application. Third, the elaboration of clearly defined production engineering and organizational conditions and demands on the operation of new equipment and technologies, which are conducive to the acceleration of the process of assimilating newly developed production capacities.

At present the relations of science and production as partners in the introduction of scientific and technical achievements are based by no means on mutually advantageous economic interests, not on clear principles, but frequently on randomly formed interpersonal relations and subjective factors. Scientific research and planning and design organizations in case of the prevailing system of the evaluation of the results of their activity frequently strive to turn over to the national economy developments, which are not always suitable for introduction or else are completely unfinished. In many cases the lack at scientific research institutes and higher educational institutions of the necessary planning and design and pilot experimental base and the shortage of material resources and equipment tell here. At times the reluctance to engage in the painstaking bringing of an innovation up to complete production readiness is also noticeable here, since in any case this will not affect economically, as well as appreciably morally, the evaluation of the work of the collective of developers and its managers.

Production, on its part, is also not directly interested in the introduction of an innovation, since its influence is not taken into account in the planning indicators. Moreover, the very process of introduction requires additional expenditures and the diversion of skilled specialists from basic activity and creates complications in the rhythm of operating production with uncertain results in the future.

As a result the complicated, but necessary and very labor-consuming process of introducing the achievements of scientific and technical progress proves as if to be in the neutral zone of the interests of scientists and production workers and becomes, so to speak, ownerless and left to survive on its own. This objectively stems from the fact that with respect to its nature and the essence of its components the process of introduction is a scientific production process, such a process that to an equal degree belongs to both science and production. Hence, too, follows the task of seeking new forms of the integration of the interests of science and production within a unified organizational framework.

The activity of specialized introducing firms is well known in world practice. As an effective intermediate link between the developer-producers and users of new equipment, they have existed for a long time and continue to be improved and to expand the set of services on the introduction of scientific, technical, organizational, and management achievements.

Various start-up and adjustment and specialized installation organizations, which are by the nature of their activity introducing organizations, have also been known for a long time and are undergoing greater and greater development. However they, as a rule, engage in the introduction of already tested scientific and technical achievements and series-produced sets of machines and equipment. It seems advisable, by using their experience as much as possible,

and, perhaps, on the basis of the largest and most ready of them, to establish a new type of introducing organization, of which the introduction in production of original scientific and technical developments, which have been created for the first time, would become the main task. Such organizations could combine fundamentally in their structure scientific research, planning and design, and production subdivisions, which are capable during introduction on their own of making the necessary modifications of the prototypes of equipment and technologies and of making improvements and adjustments in the design parameters. By fundamentally combining specific functions of developers, project engineers, designers, and operators, they will be interested participants in the process of introduction.

Here it should be emphasized: the framework of the activity and the basic functions of the proposed introducing organizations should be of an intersectorial nature and be broader as compared with the ones which the present sectorial scientific production associations have. For today the latter, and especially the main sectorial scientific research organizations, acting from a purely sectorial position, frequently create subjective obstacles for the practical implementation of the developments of other institutes, even related institutes, not to mention the developments of an intersectorial orientation.

The engineering centers, which began to be established on the initiative of the Ukrainian SSR Academy of Sciences, which was approved by the CPSU Central Committee, can serve as a prototype of such an introducing organization. Organized at the base of academic institutes of the technical type, they have without fail in them cost accounting design subdivisions and pilot works. Specialists from the works, at which the introduction of the given innovation is planned, are enlisted in work directly at the engineering center for the practical operational development and experimental testing of the developed models of new equipment and technologies. At the engineering center the scientists and designers during the joint work on the completion of the experimental model obtain the opportunity to use the know-how and practical knowledge of specialists from the works, while the latter obtain the opportunity to study the innovation thoroughly and to prepare for its industrial introduction. Such organization of the work at the engineering centers, which were established at the Institute of Electric Welding imeni Ye.O. Paton and the Institute of Cybernetics imeni V.M. Glushkov of the Ukrainian SSR Academy of Sciences, showed great effectiveness and led to the significant shortening of the time and the enlargement of the scale of the introduction of important scientific and technical achievements simultaneously in a number of sectors of the national economy.

So far such engineering centers are being established as extrastructural organizations, the relations of science with production even within them are being organized as a voluntary service. In the intersectorial introducing organization the interrelations with science and production should be consolidated on a cost accounting basis, ensuring the self-sufficiency of activity and the shortening of the time of the introduction of scientific and technical achievements.

It is clear that interdepartmental introducing firms should not be established within sectorial ministries and departments. These should be organizations, which are, for example, directly subordinate to the State Committee for Science and Technology and the councils of ministers of the union republics and organize their activity with the rights of specialized scientific production associations on a clear planning basis. Their interrelations with sectors and other organizations should be envisaged in the corresponding plans and backed by the necessary financial, material, and technical resources.

Of course, all the questions of the formation and development of introducing firms require careful study. Apparently, in the future such firms can be both narrowly specialized and integrated. But one thing is unquestionable: an active and extensive search is needed here, at which the recently adopted decree of the CPSU Central Committee and the USSR Council of Ministers on the establishment of intersectorial scientific and technical complexes and measures on the assurance of their activity is aimed.

The problem of accelerating scientific and technical progress is extremely multidimensional and affects the interests of all parties and participants in the process of social production. Many questions here need both theoretical and procedural elaboration and subsequent practical testing, during which, of course, new questions and problems will arise. And they should be solved comprehensively, by the joint efforts of scientists, specialists, and managers at all levels of production and management.

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PLANNING OF SCIENCE-PRODUCTION CYCLE IN SECTOR

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA EKONOMICHESKAYA in Russian No 2, Mar-Apr 86 pp 103-111

[Article by by A.I. Marek and G.G. Ivanov: "The 'Science-Production' Cycle Is an Object of Economic Planning"; passages within slantlines published in italics; first paragraph is IZVESTIYA AKADEMII NAUK SSSR: SERIYA EKONOMICHESKAYA introduction]

[Text] The article was prepared on the basis of the generalization of the experience and the results of the scientific research work on the improvement of the sectorial system of planning. In it an economic substantiation of the "science-production" cycle as an object of the sectorial system of planning is given. The procedural principles of the drafting of the sectorial comprehensive plan on the development of new items and the planning of reserves of production capacities and resources for the preparation and assimilation of the output of new items are examined.

The increase of the scale of production, the complication and broadening of production economic relations, and the need for a sharp increase of the technical level and quality of new products require a fundamentally different approach to the solution of a large number of problems of the economic planning activity of the sector. In recent years in party and government documents much attention has been devoted to the development of advanced comprehensive forms of the management of scientific and technical progress at all levels of the guidance of the national economy. Thus, in particular, in the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000 the need to increase decisively the role of science and technology in the qualitative transformation of productive forces, the changeover of the economy to the path of all-round intensification, and the increase of the efficiency of social production is noted [1].

The development and introduction in economic practice of an integrated system of the planning, development, assimilation, and industrial production of new types of items, which is coordinated with respect to the goals, tasks, and time, is one of the most important and urgent economic planning tasks in the area of the management of scientific and technical progress. The difficulty of the accomplishment of this task is governed by the following circumstances.

First, by the lack of such a component of the economic management mechanism as a unified comprehensive plan of operations on the development of new types of products by the basic stages of the "science-production" cycle, as well as a special-purpose managing organ, which is responsible within the framework of state planning discipline for the fulfillment of the entire set of operations and the timely removal from production of obsolete types of items.

Second, by the lack of a special-purpose sectorial system of economic and material stimulation, which orients scientific research institutes (design bureaus), associations, and enterprises toward the output of such items of new equipment, which in their design and technological parameters would ensure a high degree of economy of their production on a basis that is mutually advantageous for the producer and user.

Third, by the imperfection of the system of material and technical supply, which does not ensure the timely performance of operations at the stages of the "science-production" cycle, as well as by the poor legal planning discipline of the conclusion and fulfillment of contractual obligations.

Fourth, by the established practice of planning the production programs in associations, at industrial enterprises, and in the sector as a whole, which does not make it possible to develop in advanced reserves of production capacities and resources for the technological preparation and assimilation of the production of new types of items.

There are also a number of factors, which are connected with the shortcomings in the systems and forms of the organization of the wage, which are intended for the stimulation of the acceleration of the development of new items, and in the estimation of the economic efficiency of the introduction of new types of products.

The development of the system of sectorial planning as the basic tool of the economic mechanism of the management of the scientific production activity of the sector presumes the need to seek intensive forms of its development, first of all by means of the strengthening of the goal orientation of the system, the elimination from it of superfluous objects of planning, which have lost their significance, and its greater conformity to the specific socioeconomic tasks of the sector.

It should be noted that the objects of planning should not necessarily be unequivocally given, but can change subject to the real tasks which face the national economy and its individual sectors at a specific stage of their development. The flexibility of the system of planning should also appear, as was noted in the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1985, "On the Extensive Dissemination of New Methods of Management and the Increase of Their Influence on the Acceleration of Scientific and Technical Progress," precisely in the interchangeability of the objects of planning and the elimination from the plans of those of them, which have become obsolete.

In this connection the changeover to new methods of management, which is presently being carried out in various sectors of industry, is creating the

prerequisites for the clear separation of the objects of the centralized system of planning and other objects, which are included in the sectorial economic mechanism of management.

Taking into account that the acceleration of the development and introduction of new high-quality and economical types of products is one of the most important requirements of scientific and technical progress, it is possible to infer the need for the conversion of the "science-production" cycle into a specific special-purpose object of planning of the centralized sectorial system of planning. Precisely the sector as an integral economic mechanism has the information and resources which are required for the drafting and implementation of a comprehensive plan of the output of new items over the entire "science-production" cycle, on the basis of which it is possible to manage all the basic processes of the development of high-quality and economical models of new equipment.

The sectorial system of comprehensive planning should be aimed at:

--the strengthening of the intrasectorial, interfunctional coordination of scientific production activity, which is aimed at the acceleration of the processes of the development of new types of items with specific technical and economic parameters which conform to the goals and tasks of the economic development of the sector;

--the establishment of uniform planning discipline for the sector and material and administrative liability for the organization and performance of operations on the sectorial "science-production" cycle in conformity with the approved comprehensive plan;

--the creation of the conditions for the timely preparation and assimilation of the production of new items and for the formation of the necessary reserves of production capacities and resources, which are necessary for the fulfillment of the comprehensive plan of the output of new items;

--the assurance of the linking of the prevailing systems of the planning of the basic economic indicators of the activity of industrial enterprises, scientific research institutes, and design bureaus with the comprehensive plan of the development, assimilation, and output of new types of products.

Thus, the comprehensive plan should become a mandatory component of the plan on the scientific, technical, and socioeconomic development of the sector for the 5-year and long-range periods. In the end the special purpose of the comprehensive plan reduces to the drawing up of a planning document which includes the operations on the development of items of new equipment, the fulfillment of which requires the joint participation of the developing organizations and manufacturing enterprises, which is coordinated in time. The recommended form of the planning document, which was drawn up on the basis of the analysis of the experience of the comprehensive planning of the development of items of new equipment in the ministries of the radio industry and the communications equipment industry, is cited below.

Form 1

The Comprehensive Plan of the Production of New Items at the Stages of the "Science-Production" Cycle

Item number	Code, description of item of new equipment	Client (user), basis for conducting research and development	Code and description of item being replaced	Main performer	Estimated cost of development, thousands of rubles		Sources of financing	Economic indicators of new item		Economic indicators of item being replaced		Time of performance of development		Manufacturing plant	Preparation and assimilation of production of new items		Expenditures on preparation and assimilation of production of new items, thousands of rubles	Volume of production of new items by years	
					Total	Including contractor operations		Limit (Conditional planned) price, rubles	Rated labor intensiveness, standard hours	Wholesale price, rubles	Actual labor intensiveness, standard hours	Beginning	End		Beginning	End		198_, units per thousand rubles	198_, units per thousand rubles
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

As is evident from the cited form, not all the indicators of scientific production activity at each of the stages of the "science-production" cycle, but those of them, which characterize its special-purpose economic essence, are included in the comprehensive plan.

The time cycle of the process of the development and industrial production of a new type of items encompasses the period from the start of the performance of research and development to its series output or to the end of the period, when the given item is no longer assigned to the group "new products" (the 2d-3d year of series production), that is, to the moment when the reimbursement of the increased expenditures connected with the output of this product from special centralized sources of their covering--the fund for the assimilation of new equipment or the unified fund for the development of science and technology--is allowed.

The sectorial comprehensive plan of the development, assimilation, and output of new items over the entire "science-production" cycle is the basis for the comprehensive plans (or its components), which are formulated by scientific production and production associations and enterprises.

The majority of indicators of the comprehensive plan are in effect within the generalized "plan-report" systems, which exist in practice, in the scientific base of the sector and its industrial production. Therefore, the inclusion of these indicators in the comprehensive plan and their calculation and substantiation do not cause particular difficulties. Thus, for example, in the ratio industry a system of the management of the labor intensiveness of a new product at the stages of its development and industrial production has been developed procedurally and has been introduced in practice. The essence of this system consists in this following.

At the stage of development the ministry approves for the developing enterprise the magnitude of the labor intensiveness of the item (the limit labor intensiveness), the exceeding of which is not permitted. This induces the developers to use advanced, resource-saving design and technological solutions already at the stage of the development of the item.

At the stage of the transfer of the design documents to the manufacturing enterprise the rated labor intensiveness of the item, which should be achieved in a specific time (3 years, not more, from the start of production), is determined and approved. The procedure of its determination, the conducting of the appraisal, and approval is established. It is used when formulating the annual plans of the economic and social development of enterprises.

Upon the achievement of the rated labor intensiveness assignments on its decrease (the directive labor intensiveness) are established for enterprises on the basis of the latest (not taken into accounting in the design technology and the labor intensiveness) achievements of scientific and technical progress in the production of the given item. These assignments, like the assignments on the achievement of the rated labor intensiveness of items, are established for each enterprise, shop, section, and brigade.

Monitoring of the progress of the decrease of the labor intensiveness is established at all levels of management. The fulfillment of the assignments on the decrease of the labor intensiveness of products is taken into account when evaluating the work of labor collectives and summarizing the results of the socialist competition.

The experience of the Ministry of the Radio Industry in the use of this system has been endorsed by the USSR State Committee for Labor and Social Problems.

The introduction in the sector of the comprehensive system of the management of the labor intensiveness of items led to a qualitative change of the planning of the indicators on labor. Its essence consists in the fact that at the stage of research and development the functional orientation of the labor of designers and developers is broadened, the evaluation of the final product (result) of their scientific activity also changes. The system of material stimulation for the development of new types of items also changes, since within the framework of planning discipline sectorial science becomes responsible for the solution of the economic problems on the growth of labor productivity and the decrease of the labor intensiveness of products, which in many respect predetermine the intensification of the sectorial economy.

However, the introduction in sectorial practice of the system of the management of the labor intensiveness of products is only a partial solution of the economic problems which will find their reflection in the comprehensive plan of the development of new items within the "science-production" cycle.

The indicators of the comprehensive plan should link thoroughly within the framework of state planning discipline, on the one hand, the economic goals and tasks of the sector, which are established by the current and long-range plans of its development, and, on the other, the demands, which are dictated by these plans, on the economic characteristics of new items at the stage of their development and industrial production and, consequently, with the amounts of the economic stimulation funds and various bonus funds for the development and output of items of new equipment. The inclusion in the system of planning documents of indicators, which reflect the economic demands of the sector on research and development, will lead, as was noted above, to the qualitative change of the content of the process of the labor of workers of scientific research institutes and design bureaus and to the change of their occupational thinking and will force one to solve the engineering problems in case of the strict observation of the economic interests of the sector as a whole and the specific plants which are the producers of new products.

The availability of such information in the sectorial system of planning is extremely necessary, since it makes it possible to evaluate the efficiency of the assimilation and output of new products and to prevent undesirable economic consequences. Therefore, such indicators as the limit (conditional planning) price and the rated labor intensiveness (production cost of products), on the basis of which the enterprise can determine the economic advance or disadvantage of the output of the given item, should be included without fail in the comprehensive plan at the stage of research and development. By comparing the established (planned) level of the economic indicators at an enterprise (in the sector) with the corresponding economic

characteristics of a new item in their interconnection with the fund-forming indicators and standards, it is possible to establish quite definitely the degree of the economic interest of the specific enterprise in the assimilation and output of items of new equipment.

At present, as the sectorial practice of planning shows, it does not seem possible to evaluate comprehensively the influence of new items on the economic indicators of the production operations of both the sector as a whole and its individual enterprises. In this connection, in our opinion, it is advisable as a mandatory appendix to the basic planning document--the comprehensive plan--to draw up a planned accounting document in accordance with the form cited below.

The principles of the calculation of each of the indicators cited in the comprehensive plan are not examined in this article, since they are quite well known and are cited, in particular, in the Procedural Instructions on the Drafting of the Plans of Socioeconomic Development in the Sectors of the USSR National Economy [2], the Model Method of the Drafting of the Technical, Industrial, and Financial Plan of the Production Association (Combine), Enterprise [3], and the sectorial instructional and procedural documents, which correspond to them.

However, in the comprehensive plan there are indicators, the calculation of which causes some difficulty, and first of all this pertains to the economic indicators of a new item, which are included in the planning documents for research and development. Now these indicators are determined directly by the developer of the new item with respect to an analogue, which has been selected by him, and on the basis of the scientific and technical solution, which has been developed by him. Therefore, the manufacturing enterprises in case of the introduction in production of new items perforce "acquire" the indicators, which sectorial science "designed" for them. Moreover, such indicators as the economic efficiency of a new item (with respect to the analogue which was selected by the developer), its planned price, the rated labor intensiveness, and so on are calculated and substantiated in the planning documents for research and development by the developer (the scientific research institute, the design bureau) on the basis, as a rule, of the level of the development of the economy of industrial production at the moment of the drawing up of the technical assignment for the development, and not during the period of its completion and introduction.

If it is taken into account that the time of experimental design work (without regard for the period of the preparation and assimilation of the production of a new product) in sectors ranges on the average from 2 to 5 years, it becomes clear that the economic indicators of one of the basic goal-determining planning documents for research and development, such as the technical assignment is, obviously lag behind the corresponding indicators of the plans of the development of industrial production on the average by at least 3-4 years. As a result even the proposed estimated economic efficiency of the development of a new item, which is determined at the stage of the approval of the technical assignment, reduces to naught by the moment of the introduction of completed research and development. Here only the manufacturing enterprises, which have been forced to accept these new items for assimilation

and production, incur economic losses and experience additional difficulties when fulfilling the plan.

The resolution of such a contradiction, in our opinion, lies in the sphere of the solution of the problems of improving not so much the system of the stimulation of the development of a new item as the calculation of the indicators when formulating the comprehensive plan and in the need for the formulation (not in the form of an "abstract" estimated impact) of quantitatively specific economic demands on the new product, which are reflected in the corresponding indicators of the comprehensive plan at the stage of research and development. Thus, the values of the plan indicators of the development of the enterprise make strict demands on the economy of the items which are being designed by the developing enterprise. The consideration of these requirements will make it possible to improve qualitatively (from the standpoint of the economy of the sector as a whole) the results of the activity of scientific research institutes and design bureaus and to a significant degree to overcome the economic difficulties, with which industrial enterprises are faced in case of the introduction and series production of items of new equipment.

Such a mechanism of planning ensures the economic unity of the goals and tasks of the sector at each of the stages of the "science-production" cycle and can be developed in accordance with a procedural scheme which envisages the fulfillment of the following operations.

The /first stage/ is the forecasting and long-range (for a 10-year and 5-year period) planning of the level and growth rate of the basic economic indicators of the sector (association, enterprise), which is carried out under the conditions of the existing and forecast limitations on resources.

The /second stage/ is the formation on the basis of the long-range plans (forecasts) of consolidated standard economic indicators (the labor intensiveness, the production cost, and others), which are to be included in the planning and organizational documents for research and development as one of the most important assignments in case of the development of new types of products.

The /third stage/ is the formation of a scale of the dependence of the standard economic indicators of completed research and development on the time of their elaboration.

The /fourth stage/ is the organization of a system of the evaluation and stimulation of the activity of workers of scientific research institutes and design bureaus for the achievement of the level of the economic standards and the consideration of the demands on the items of new equipment, which are being developed.

The /fifth stage/ is the drafting (starting with the stage of the approval of the technical assignment for research and development) of the sectorial plan of the increase of production efficiency, which links and balances the development of the economy of industrial production with the economic indicators (characteristics) of new types of products.

Form 2

The Influence of a New Product on the Basic Economic Indicators of Production Operations

Descrption of new types of items according to plann	Economic indicators of the object being planned during the base period				Proportion of output of new items in planned output of products	Economic indicators with respect to new items and their influence on the indicators of the base year (preplanning period)									Total amount of saving (losses) in case of production of new items		
	Labor intensiveness of 1,000 rubles of output of product, man-hours	Expenditures per ruble of commodity production	Output per worker of industrial personnel directly engaged in production, rubles	Other economic indicators		Labor intensiveness of 1,000 rubles of output of product, man-hours			Expenditures per ruble of commodity production			Output of products per worker of industrial personnel directly engaged in production, rubles			Other economic indicators	On labor intensiveness, man-hours	On production cost, thousands of rubles	On number of workers of industrial personnel directly engaged in production
						Value of indicator	Deviation from base level		Value of indicator	Deviation from base level		Value of indicator	Deviation from base level					
							absolute	per-cent		absolute	per-cent		absolute	per-cent				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Item 1																		
Item 2																		
Item 3																		
.....																		
As a whole for new product																		
As a whole for the object being planned																		

The bulk of the calculating work to one degree or another is carried out in the sectors and can be used for the formulation of the comprehensive plan and the calculation of the economic indicators which constitute its basis.

At present in the sectors forecasts to 2000 and beyond of the basic technical and economic indicators (including the development of individual directions of technology) have been formulated, a set of long-range economic norms and standards and so on is in effect in the practice of plan calculations. These technical and economic indicators can become the real basis for the development of a set of standards (at the first stage a consolidated set) for the research and development which are being planned for elaboration. The conversion of the economic standard requirements into the corresponding indicators--the assignments for the development of a new item at the stage of research and development--in the end is the economic basis of the comprehensive plan of operations over the entire "science-production" cycle and the real basis for the fulfillment of the long-range plans and forecasts of the development of the economy of the sector.

The preparation and assimilation of the production of new items are one of the stages of the comprehensive plan, which are important with respect to their economic, planning, and organizational purpose. It is the connecting link in the conversion of the end results of the activity of sectorial science into the end target result of the production operations of the sector--the meeting of the need of clients (consumers) and the national economy as a whole for new technically high-quality and economically efficient types of products. At precisely this stage the accomplishment, which is compatible with respect to time and resources, of the sectorial tasks on the acceleration of the development and output of new items and the increase of their quality and economy is not only possible, but also necessary. The inclusion of the stage of the preparation and assimilation of the production of new items in the comprehensive plan will make it possible to attach in good time to plants the output of new items and will create the real basis for the attachment of the manufacturing plant to the accomplishment of this priority task of the sector not from the moment of the completion of research and development and the transfer to it of the technical specifications, but at earlier stages.

Thus, in the Ministry of the Communications Equipment Industry the practice of financing the expenditures on the preparation of the production of new items from the fund for the assimilation of new equipment, starting with the stage of the detail design for research and development, has already been introduced. In the Statute on the Procedure of the Calculation, Planning, and Financing of Expenditures on the Preparation of the Production of New Items at the Expense of the Fund for the Assimilation of New Equipment From the Stage of the Detail Design for Research and Development, which has been introduced in the sectorial practice of financial planning activity, the composition, content, and procedure of the financing of specific types of operations on the preparation of production are established, and a number of other economic and management problems are also solved.

The combining with respect to time of the stage of the preparation and assimilation of production with the stage of the drawing up of the detail

design for research and development not only speeds up the start of the series production of new items and shortens the time of the achievement of the most complete satisfaction of the consumers of new products, but also creates the necessary planning and organizational prerequisites for the practical implementation of measures on the creation of reserves of production capacities and resources for the production, assimilation, and introduction of new equipment in conformity with the basic tasks which were posed at the conference on questions of the acceleration of scientific and technical progress, which was held in June 1985 in the CPSU Central Committee. The economic, resource, and organizational planning interconnection of the questions of the preparation and assimilation of the production of new items is predetermined by the fact that, first, the attachment, which is set down by the plan, of manufacturing plants to the process of their development, starting with the drawing up of the detail design for research and development, gives them a real (established by the plan) reserve of time for the preparation and assimilation of production and, second, the time reserve being formed prior to the start of the series output of new products is backed by the appropriate financial assets from the fund for the assimilation of new equipment.

At present in a number of machine building sectors the procedural elaboration of a set of questions, which are connected with the creation of reserves of production capacities and resources for the preparation and assimilation of new items, is being carried out. In particular, a set of documents for the formulation of the plan of the creation of reserves of production resources, which are necessary for the timely series production, which is established by the deadlines of the comprehensive plan, of new items with the required technical, operating, and economic characteristics, is being drafted and the organizational management procedure of their drawing up, coordination, and approval is being developed; the specific production resource structure of the reserves being created at industrial enterprises and of the financial sources of their covering is being determined; a consolidated list of technical and economic measures, the implementation of which is necessary for the offsetting of the temporary economic losses (with respect to the economic assignments established in the plans), which are possible in case of the diversion of a certain portion of the sectorial production and first of all manpower resources for the preparation and assimilation of the production of new products, is being determined.

The existence in the sectorial system of planning of a comprehensive plan of the development of new items is of great importance for the organization of sectorial scientific production complexes. The establishment of scientific production complexes today is actually feasible only within individual scientific production and production associations which perform the entire set of operations on the development, assimilation, and production of new products, on the condition of the most complete cost accounting and the granting to them of the maximum possible independence in the making of decisions at all the stages of the "science-production" cycle. The comprehensive sectorial plan of the development of new items is the basis of the conversion of the sector into a kind of national economic scientific production complex, within which special-purpose scientific production complexes can be established.

The presence in the sectorial economic mechanism of the comprehensive plan of the development of new items is assuming particular importance for the improvement of the contractual system of the delivery to related sectors of the components and materials, which are necessary for the production of new products. Whereas for items, which have been assimilated in series production, the range, quantity, and technical and economic parameters of the components and the time of their delivery are established and are set down legally in the corresponding plans and contractual obligations of the related sectors, for items being newly assimilated and especially for items at the stage of development the sectorial planning information, which makes it possible in advance and in good time to draw up the plan-orders for the delivery of complete sets, in practice is lacking.

In our opinion, the approved comprehensive plan of the development of new items will make it possible in a legally strict manner, within the framework of state and sectorial planning discipline, to specify the time of the conclusion of contracts and to make specific demands of the user sectors on new items of the supplying sectors.

In practice only the comprehensive plan can become the planning information base for the establishment in the long-term contracts of related sectors of specific obligations on the range, quantity, and technical and economic characteristics of the components, raw materials, and materials, which are planned for delivery, for the production of new products.

This article, undoubtedly, does not exhaust the entire set of procedural, practical, and organizational questions, with the settlement of which the creation of an effective sectorial economic mechanism of the management of the development, assimilation, and production of new items is connected. However, in our opinion, the drafting of a comprehensive plan of the development of new items as an integral part of the sectorial system of planning and the conversion of the "science-production" cycle into an object of economic planning are a necessary and objective condition of the creation of such an economic mechanism, the functioning of which will be aimed at the accomplishment of the most important task of scientific and technical progress--the speeding up of the production of new high-quality and economical products.

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ORGANIZATION, PLANNING AND COORDINATION

PATON ON MATERIALS-OUTPUT RATIO AS KEY FACTOR OF PROGRESS

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[Article by President of the Ukrainian SSR Academy of Sciences B. Paton, delegate of the 27th CPSU Congress, under the rubric "The Improvement of the Economic Mechanism" (Kiev): "Scientific and Technical Progress and the Decrease of the Materials-Output Ratio"; first paragraph is MATERIALNO-TEKHNICHESKOYE SNABZHENIYE introduction]

[Text] At the 27th CPSU Congress it was noted that the party will promote in every possible way the further increase and the efficient use of the scientific and technical potential of the country and the development of scientific research, which affords new possibilities for major, revolutionary changes in the intensification of the economy. Science should fully become an immediate productive force. This demand equally affects both production and science. The close union of science and production is a guarantee of the successful fulfillment of the new tasks which have been posed by the party.

The basis of the principles of the intensification of the economy is the increase of the output of products without the corresponding increase of the resources of all types, which are being committed to the national economic turnover. The problem of decreasing the expenditures of the national labor, which is contained in fuel, raw materials, and materials, is acquiring particular urgency. At present they amount to more than half of the expenditures on the production of the national product of the country. Therefore, one of the most important directions of the efficient economic and technical policy today is the policy of the decrease of the materials-output ratio of the products being produced.

This is a complicated and multidimensional problem which includes such aspects as the development and extensive industrial assimilation of advanced technologies of the obtaining and processing of various materials, the improvement of the regulations and norms of designing and engineering, the elaboration of scientifically sound rates of consumption, and the increase of the reliability and durability of machines, devices, and structures.

The changeover to fundamentally new technological systems and to high quality equipment of the latest generations, which yield the greatest efficiency, is the fundamental means of solving the indicated problem. Success can be

achieved here only in case of the vigorous and large-scale use of the latest achievements of science, first of all in such areas as the mechanics of deformable solids, solid-state physics, the physical chemistry of inorganic materials, new processes of the obtaining and processing of metallic materials, polymer chemistry, and others.

Under the conditions of the present scientific and technical revolution, which has accelerated by many fold the progress of both science itself and production, one must not divorce the search for new knowledge from its practical use. The separation of one from the other inevitably dooms technical innovations to obsolescence and decreases the pace of scientific and technical progress. The high level of basic research should be combined without fail with a clear idea of the possibilities of using the results being obtained and be backed by persistent work on their practical implementation.

Today the more and more distinct orientation of theoretical and experimental research toward the solution of practical problems, first of all of a technological nature, is becoming the dominant trend of the development of science. It, of course, also received reflection in the activity of the Ukrainian SSR Academy of Sciences.

The obtaining of new materials with high technical and economic parameters and their extensive use in the sectors of the national economy are the central thing of the problem of decreasing the materials-output ratio. On this basis the practice of the planning, designing, and organization of the series production of new equipment should be radically reformed.

The potentials of new materials are enormous. Their use is making it possible to decrease significantly the weight of machines and structures, to abandon the use of very scarce, expensive traditional materials, and to improve the operating characteristics of items.

The new antifriction material for the friction units of steam turbines, which was developed by the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences, can serve as an example. Its use makes it possible not only to simplify the maintenance of the units and to replace the traditional lubricant with water, but also to decrease the weight and dimensions of the turbine by 20-30 percent.

In spite of the intensive increase of the volumes of production of all kinds of materials based on aluminum, titanium alloys, various composite materials, and plastics, steel will remain the most prevalent construction material to the end to the current century. The closest attention of scientists and production workers to the questions of the increase of the quality of steel, its efficient and economical use, and the reduction to a minimum of the losses at all stages: in metallurgy--during the smelting of pig iron and steel, in the production of rolled products, in the consuming sectors--during the production of machines and components and the construction of structures, is required here.

Scientists of the Ukrainian SSR are devoting serious attention to the solution of these problems. A new sector of metallurgy--special electrometallurgy, of

which metal and blanks of especially high quality are the products--was established on the basis of their developments. In spite of the fact that for about three decades now special electrometallurgy has been undergoing introduction in the sectors of the national economy, there is not enough of the metal which is produced by its methods. And this is moderating greatly the decrease of the metal content of machines and mechanisms.

The potentials of electroslag technology--the basis of special electrometallurgy--as the latest research of scientists of the Institute of Electric Welding imeni Ye.O. Paton shows, are very significant. In recent years a new direction of it--electroslag casting--which makes it possible to obtain items of complex form with the minimum machining allowances, has been developed. This is ensuring a drastic reduction of the losses of metal during machining. Moreover, electroslag technology makes it possible to reclaim metal scrap in the form of crop ends, chips, and worn out parts and tools. The experience of such Kiev enterprises as the Bolshevik Production Association, the Stroydormash Plant, and others convincingly confirms this.

The reliability and durability of machines and mechanisms are an important reserve of the decrease of the expenditures of metal in the national economy. They are ensured first of all by the increase of the strength and wear resistance of the most crucial parts and assemblies. The protective and strengthening coatings, which were proposed by scientists of the academy and are applied by the gas thermal, ion plasma, electric arc, and detonation methods, are very effective. Their use in machine building and other sectors of industry is making it possible to save metal and alloying elements and to meet the constantly increasing demands on operating conditions.

The Ukrainian SSR Academy of Sciences has a strong scientific potential and a technological and pilot industrial base in this area. The Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences has been appointed the main organization in the USSR for the problem of strengthening protective coatings. The technologies and equipment for the application of coatings, which have been developed here, are already being used at enterprises of the Ministry of the Automotive Industry, the USSR State Agroindustrial Committee, the Ministry of the Gas Industry, the USSR Ministry of Ferrous Metallurgy, and a number of machine building ministries.

The technologies of applying various coatings, which were proposed by the Institute of Problems of Material Science, the Kharkov Physical Technical Institute, the Physical Mechanical Institute (Lvov), and others, have shown great effectiveness.

A promising direction of the saving of metal and the increase of the operating life of rapidly wearing parts is the extensive use of hard facing during their production and repair. Hard facing is already now saving annually about 2 million tons of steel. If the need for hard facing materials in the amount of about 15,000 tons is met, this will yield an additional saving of 2 million tons of metal and, in addition, will make it possible to increase significantly the reliability and durability of various equipment.

The Institute of Electric Welding imeni Ye.O. Paton developed equipment for the hard facing of crankshafts of engines, track wheels of tractors, pistons, gear wheels, and a number of other parts. Several models of hard facing machines are already being produced by the Chelyabinsk Remdetal Production Association and are being used at enterprises of Ukrainian State Agroindustrial Committee. The reconditioning of parts by the hard facing method makes it possible to reduce by 15-30 percent the need for spare parts and by 10-17 percent the repair expenses and in so doing to increase significantly the quality of the repaired assemblies and units.

The methods of powder metallurgy are affording great possibilities of the saving of materials. The use of powdered construction materials makes it possible to increase significantly the utilization ratio of metals and to decrease the labor intensiveness of the production of parts. A wide range of such powdered materials, which are used in many sectors of industry, has been developed at the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences. In particular, technological processes of the obtaining of dense powdered stainless steels of the austenite class by the method of hot stamping have been proposed. These steels, which have increased strength, are intended for parts which experience impact loads in corrosive media. In all the institutes of the Ukrainian SSR Academy of Sciences during the 11th Five-Year Plan developed more than 350 types of new materials, of them 275 have already found application in the national economy.

The assurance of the efficient use of metal and other materials at the stage of the production of items is an important national economic task. For example, the use of differentiated rolled stock results in great efficiency. In construction, for example, this provides a saving of 110 kilograms of metal per ton of components.

Scientists of the Institute of Cybernetics imeni V.M. Glushkov jointly with the All-Union Scientific Research, Design, and Technological Institute of the Pipe Industry (Dnepropetrovsk) developed and introduced at enterprises of the USSR Ministry of Ferrous Metallurgy a system of the optimum utilization of pipe mills of the country and the placement of orders of consumers. The opportunity appeared to abandon the purchase abroad of bearing pipes. The average weight of casings for oil wells was reduced by more than 5 percent, which made it possible to increase their production substantially. In other words, an increase of production, which is equal to the placement into operation of two heavy-duty mills, can be obtained without additional capital investments.

An extensive set of measures on the assurance of the efficient use of natural, material, and technical resources and production waste was elaborated and is being implemented jointly with the Ukrainian SSR State Committee for Material and Technical Supply and the Ukrainian SSR Academy of Sciences. Much attention is being devoted to the elaboration of a balance of the formation and use of industrial waste and secondary resources and to the creation of the corresponding material and technical base for their commitment to the economic turnover. A search is being made for more efficient forms of cooperation, which ensure the rapid introduction in the system of the Ukrainian SSR State Committee for Material and Technical Supply of the results of scientific

developments and scientific and technical developments of institutions of the Ukrainian SSR Academy of Sciences, which are aimed at the more complete use of metal products and the processing of secondary raw materials.

The introduction of advanced technologies, including technologies of the processing of materials, is one of the means of decreasing the materials-output ratio in the national economy. The development of such technologies requires a solid scientific basis. Modern technology is a kind of bridge, which connects scientific theory with the practice of social production. The development on the basis of basic research of fundamentally new technologies, which ensure radical changes in production, is the main unit of the acceleration of scientific and technical progress. Such an approach, which was developed at the Ukrainian SSR Academy of Sciences more than 10 years ago, is one of the basic principles of the work of academic institutions.

In recent years the institutes of the academy have developed many highly efficient technologies of the processing of materials, which are based on different physical principles. Among them are the technologies of the processing of hard alloys by high hydrostatic pressure, electric arc alloying, and the islet hardening of surfaces, as well as friction strengthening treatment, flat-top honing, and others. However, the possibilities of the efficient use of materials, which have been incorporated in them, are completed revealed only on the condition of their sufficiently broad assimilation by industry, and first of all by machine building.

The designing of new equipment and technology is an important stage of the practical implementation of advanced ideas. The basic technical and economic parameters of production facilities are incorporated precisely at the stage of the development of designs. And the pace of technical progress and, of course, the level of the materials-output ratio of production of tomorrow depend on how completely and timely the latest achievements of science and technology are taken into account in these designs.

Unfortunately, serious shortcomings are inherent in the system of the development of designs. The experience of the work of the Ukrainian SSR Academy of Sciences shows that the multistage nature of the drawing up of design documents, the weakness of the coordination of the work among the participants in designing, their lack of the necessary reserves for the future, and the unjustified decrease of the outlays on predesign research and surveys are the main ones of them. This is leading to the dragging out of the investment period, the loss of novelty, and, consequently, the decrease of the output of the facilities being developed.

The use of computer-aided design (SAPR) affords favorable prospects for shortening the time of the drawing up of design documents and increasing their quality. The Institute of Cybernetics imeni V.M. Glushkov jointly with the Scientific Research and Design Institute of the Transgas Automated Control System (Kharkov) developed and introduced at all the design institutes of the republic and Leningrad of the computer-aided design of systems of the automation and remote control of gas pipelines. During the time of its existence more than 50 plans of the automation of the Urengoy-Pomary-Uzhgorod, Urengoy-the Center, Yamburg-Yelets, Kursk-Kiev, and other main gas pipelines

have been developed. An economic impact is being achieved by the use of new design modules, the interactive mode of designing, and the high level of the automation of design operations (85-90 percent). In all 5-6 hours are spent on the preparation of 1 design. By hand a similar design is prepared by a group of 5-6 people in 2-3 weeks.

As the experience of the Institute of Electric Welding imeni Ye.O. Paton shows, the joint performance of design work by scientists and production workers is conducive to the shortening of the time of the development and the increase of the quality of new equipment and technology. Owing to such cooperation arising problems of agreement and coordination are solved promptly, in a businesslike manner, and without delays. This experience merits further development and extensive dissemination.

The practice of the drafting and approval of new state standards and standard technical specifications also requires improvement. It does not satisfy the requirements of today, not only does not stimulate the introduction of advanced technologies and models of ready equipment, but often hinders it. The existing standards of the consumption of natural, material, and technical resources, which are being committed to the economic turnover, also need revision. They should be brought in line with the requirements of the intensification of the national economy.

In the designs of technological systems and equipment as a mandatory condition it is necessary to envisage the increase of labor productivity and the decrease of the consumption of fuel and electric power per unit of power or amount of work performed, as well as of raw materials in terms of the output of finished products. These standard indicators should be regulated by specially developed standards, which should be revised every 3-4 years in conformity with the latest achievements of science and technology.

It is well known that today it is entirely insufficient to design the most advanced item. It is also necessary to provide the design with tens of documents many pages long, which in reality no one needs. Calculations show that due just to the reasonable simplification of the rules of the drawing up and especially the coordination of technical assignments and the conditions of their turning over to the interdepartmental commission and other purely coordinating functions the time of the development of new machines can be shortened by 2-2.5 years.

The Ukrainian SSR Academy of Sciences is actively participating in the implementation of the republic comprehensive program "The Materials-Output Ratio." Practically all the ministries and departments, oblasts, and more than 275 scientific, planning, and design organizations and large associations have united efforts within it. The program is an important element in the solution of the problem of decreasing the materials-output ratio of products and increasing on this basis the efficiency of social production. The Ukrainian SSR Academy of Sciences is the main organization for this program.

Within the framework of the program more than 30 new technologies were developed and introduced in machine building, 12 new materials and 6 types of new equipment were proposed, which ensured the obtaining of an economic impact

of more than 135 million rubles. In particular, the Institute of Superhard Materials of the Ukrainian SSR Academy of Sciences developed a technology of the synthesis of diamonds by explosion without the use of expensive press equipment and hard alloy accessories. Here a saving of 0.8 kilogram of hard alloy per 1,000 carats of produced diamonds is being achieved.

During the fulfillment of the program "The Materials-Output Ratio" a large economic impact was achieved and "feedback" between production, on the one hand, and academic science and science of higher educational institutions, on the other, between the introduction of developments and the formation of new directions of goal-oriented basic research was established.

At the same time practice showed that the inclusion in the program of developments, which are connected with the saving of materials, without preliminary pilot industrial checking leads to the difficulty of their implementation and, as a result, the need to eliminate individual assignments. These and other shortcomings were taken into account when formulating the new program for the 12th Five-Year Plan. More than 30 percent of the solutions, which were obtained during the implementation of the present program, have been incorporated in it.

When formulating the new program a specific goal was set--half of the saved metal and cement should be obtained as a result of the use of new scientific and technical solutions.

For the purpose of interconnecting the assignments of the new program "The Materials-Output Ratio" at the regional level the task of formulating the corresponding programs was posed for the oblasts of the republic. The achievement of a saving of material resources mainly by the introduction of scientific and technical innovations is envisaged in them. The scientific centers of the academy are proving much assistance here. They are drawing up and disseminating catalogues of completed scientific and technical developments which are recommended for introduction at the enterprises of the given region. Expert groups of scientists, which make procedural assistance available locally in the formulation of the programs, have been set up.

The problem of decreasing the materials-output ratio also found reflection in the organization of joint work of scientific institutions and the introduction of its results on an interrepublic basis. Within the framework of the cooperation of the Academies of Sciences of the Ukraine, Belorussia, and Moldavia, which has been successfully developing for more 10 years, in 1982 the interrepublic program on the problem "The Scientific Principles and Methods of the Increase of the Reliability and Durability of Machines and Structures and the Decrease of Their Materials-Output Ratio" was formulated. A decision on the mutual promotion of the introduction of the developments, which are being carried out at academic institutions, and the exchange of lists of the developed technologies for study in the state planning committees of the republics and with interested sectors was made at the conference on questions of the cooperation of the three academies of sciences. The most important results of the joint work have already been introduced in the national economy of the republics of the region.

The Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences and the Institute of Problems of the Reliability and Durability of Machines of the Belorussian SSR Academy of Sciences developed and introduced at the Gomel Machine Tool Building Plant imeni S.M. Kirov a technology of the die-welding construction of the base assemblies of a series-produced multiple-operation drilling and milling machine, which made it possible to decrease significantly its dimensions and weight.

The introduction at the Minsk Motor Plant of the technological process, which was developed by the Institute of Strength Problems of the Ukrainian SSR Academy of Sciences, of strengthening the cylinder sleeves of internal combustion engines by the application to them of coatings of a discrete structure of increased adhesive and cohesive strength made it possible to obtain an annual economic impact in the amount of 10.5 million rubles.

In accordance with this interrepublic program the development of new technological processes of welding and advanced methods of the surface hardening of parts of machines and the development of new metal-containing polymer and cermet materials are planned. The work will also be continued during the 12th Five-Year Plan.

The Council for the Promotion of Scientific and Technical Progress attached to the Ukrainian CP Central Committee, which is headed by Member of the Politburo of the CPSU Central Committee and First Secretary of the Ukrainian CP Central Committee V.V. Shcherbitskiy, is giving much assistance in the organization of the effective cooperation of the efforts of workers of science and production in the solution of the problem of decreasing the materials-output ratio of products. Having extensive powers, this authoritative organ is actively contributing to the organization of the creative cooperation of scientific and production collectives, the surmounting of departmental barriers, and the elimination of everything that hinders the efficient use of the achievements of science and the technical updating of production in the republic.

The entire set of questions of the assurance of the large-scale introduction of the results of scientific research and advanced technological developments is constantly in the field of view of the presidium of the academy and its institutions. The work has been performed for a long time now. Considerable experience has been gained.

The participation of the institutions of the Ukrainian SSR Academy of Sciences in comprehensive scientific, technical, and socioeconomic programs of large enterprises and production associations is contributing to the rapid movement into production of the latest achievements of scientific and technical progress.

At present the institutions of the Ukrainian SSR Academy of Sciences are maintaining creative relations with enterprises and organizations of 35 union and union republic ministries, 20 ministries and departments of the Ukrainian SSR, and 10 ministries of other union republics. At the institutes of the Ukrainian SSR Academy of Sciences 57 sectorial problem laboratories of 29 union and republic ministries, the activity of which is contributing to the speeding up of the practical implementation of the available theoretical

reserves for the solution of the problems facing the sectors of the national economy, including the decrease of the materials-output ratio, are in operation.

The task of increasing the quality of scientific developments and their readiness for extensive industrial introduction required the establishment in the system of the Academy of Sciences of its own experimental design and experimental production base. Its organization began back in the 1960's. Today the total number of facilities of this base has reached 74 (in 1965 there were 16 of them). Among them are 10 pilot plants, 27 pilot and experimental works, 32 design bureaus, as well as 5 computer centers.

The total amount of work performed by these organizations in 1984 alone came to 226 million rubles. A large quantity of the latest equipment, components, and materials is supplied annually to the national economy. Among them, for example, are automatic machines and units for the performance of welding and hard facing work, the performance of the technological processes of applying metallic powders to the surface of items for their protection against corrosion and the technological processes of producing fibers from rock, tools made of superhard materials, and much else.

In recent years large scientific and technical complexes (NTK), to which along with the institutes proper design bureaus, pilot works, and pilot plants belong, have been formed and have been operating successfully in the system of the Ukrainian SSR Academy of Sciences at the base of a number of leading institutes. By performing the entire cycle of operations from the idea to introduction, they are ensuring a significant shortening of the time of the practical implementation of scientific developments. The activity of such complexes is contributing to the rapid implementation of developments, especially ones of sectorial importance.

The many years of experience of the Ukrainian SSR Academy of Sciences in the organization of the extensive practical use of intersectorial innovative developments, the majority of which are connected with the problem of decreasing the materials-output ratio, convince us that the difficulties, which arise during their introduction, stem from the lack of adequate organizational forms which promote the acceleration of this processes and the elimination of the obstacles in its way. This became especially perceptible after a number of studies of scientists of the academy lead to results of great practical importance.

The formation within the scientific and technical complexes of the Ukrainian SSR Academy of Sciences of engineering centers was a qualitatively new step in this direction. They are called upon to speed up the development on the basis of the results of basic research of new advanced technologies, materials, equipment, and control systems and to ensure their large-scale introduction and highly efficient use in various sectors of the national economy.

The engineering centers work on a cost accounting basis with production associations and enterprises of various ministries and departments, which act either as the clients of their products and services or as producers of the

latest production equipment and materials. They also cooperate closely with related scientific research and planning and design organizations.

The work on the establishment of engineering centers began at the Ukrainian SSR Academy of Sciences 5-6 years ago, while their organizational formation for the most part was completed in 1984. At present 9 engineering centers are operating in the academy. At the Institut elektrosvarki imeni Ye.O. Patona Scientific and Technical Complex there are six of them: pressure welding, electron beam technology, the robotization of the production of welded components, electroslag technology, protective and strengthening coatings, and explosion metal working. The engineering centers of microelectronics and bank automated systems have been established at the Institut kibernetiki imeni V.M. Glushkova Scientific and Technical Complex; the engineering center for the development of high-pressure and high-temperature equipment for the obtaining of superhard materials has been established at the Institut sverkhtverdykh materialov Scientific and Technical Complex.

The activity of the engineering centers is making it possible to solve effectively the problems of decreasing the materials-output ratio of production in various sectors of the national economy. Thus, for example, at the engineering center of electroslag technology, which is cooperating with eight union ministries, highly efficient technological processes and equipment of centrifugal and chill electroslag casting have been developed. The changeover to the production of machine building blanks by means of electroslag processes makes it possible to save a significant amount of metal, to abandon expensive forging operations, to decrease the amount of machining, and to increase labor productivity and the standards of production.

The activity of the engineering center of electron-beam technology is aimed at the development and the assurance of the large-scale introduction in the national economy of the technologies, equipment, and materials, which were created as a result of basic research of the physical technical processes in case of the electron-beam smelting of metals and the laws of the electron-beam vaporization of metallic materials. The technological developments in the area of electron-beam smelting have found extensive application in the obtaining of refractory metals and alloys.

Condensation processes are being used in obtaining various coatings on items, first of all protective coatings on the vanes of gas turbines for various purposes. Such coatings increase by three- to fivefold the operating life of the vanes and decrease the number of idle times between repairs. The electron-beam technology of depositing protective coatings on vanes has been adopted as the basic technology at enterprises of a number of machine building sectors, while the basic types of equipment and materials have been introduced at more than 40 enterprises of 8 ministries.

The accomplishment of the important tasks of the 12th Five-Year Plan requires of us a more weighted and responsible approach than today to the use of the material resources which are at the disposal of the national economy. The optimization of the main parameters of social production, and first of all its materials-output ratio, should become the basis of this approach.

We have considerable prerequisites for this. The progress of science and technology is affording even greater possibilities. The crucial task of scientists and production workers is to broadening these possibilities in every possible way and to make them accessible to the sectors of the economy. Its accomplishment will help to fulfill successfully the plans of the 12th Five-Year Plan, to accomplish the intensification of production, and to ensure the necessary dynamism of our socioeconomic development.

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ECONOMIC STIMULATION FUNDS OF SCIENTIFIC ORGANIZATIONS

Moscow EKONOMICHESKAYA GAZETA in Russian No 21, May 86, No 22, May 86

[Statute on the Formation and Use of Economic Stimulation Funds at Scientific Research Institutions, Design, Technological, and Other Organizations of Science of the USSR State Committee for Science and Technology, the USSR State Planning Committee, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, the Presidium of the USSR Academy of Sciences, and the All-Union Central Council of Trade Unions]

[No 21, May 86 p 17; first two paragraphs are EKONOMICHESKAYA GAZETA introduction]

[Text] The USSR State Committee for Science and Technology, the USSR State Planning Committee, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, the Presidium of the USSR Academy of Sciences, and the All-Union Central Council of Trade Unions in conformity with the decree of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions "On the Improvement of the Remuneration of the Labor of Scientists, Designers, and Process Engineers of Industry" have approved "The Statute on the Formation and Use of Economic Stimulation Funds at Scientific Research Institutions, Design, Technological, and Other Organizations of Science." The peculiarities of its application in individual ministries (departments) are specified by the corresponding USSR ministries (departments) and the councils of ministers of the union republics in consultation with the USSR State Committee for Science and Technology, the USSR State Planning Committee, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, and the All-Union Central Council of Trade Unions.

"The Statute on the Procedure of the Formation and Use of Economic Stimulation Funds at Scientific Research, Design, Planning and Design, and Technological Organizations, Production Associations, and Enterprises, Which Have Been Converted to the Cost Accounting System of the Organization of Work on the Development, Assimilation, and Introduction of New Equipment on the Basis of Supply Orders (Contracts)," which was approved on 10 April 1980, is deemed invalid.

This Statute establishes the procedure of the formation and use of economic stimulation funds at scientific research institutions, design, technological, and other organizations of science and the deductions for the economic stimulation funds of production associations and enterprises, (Footnote 1) (Hereinafter scientific research institutions, design, technological, and other organizations of science are called "organizations," while production associations and enterprises are called "enterprises") which have been converted to the cost accounting system of the organization of work on the development, assimilation, and introduction of new equipment, (Footnote 2) (Hereinafter the work on the development, assimilation, and introduction of new equipment is called "work on new equipment," by which the measures on the scientific organization of labor are also understood) as well as the deductions for the funds, which are established in conformity with prevailing procedure, of the organizations and enterprises, which are the coperformers of the work on new equipment and have not been converted to the indicated system, regardless of their departmental affiliation.

The Formation of the Funds

1. The sources of the deductions for the economic stimulation funds of organizations and enterprises for the performance of work on new equipment are:

1.1. The deductions from the profit, which is formed at the enterprises of their own or other ministries (departments) due to the actual decrease of the product cost (cost of the performance of work or services) as a result of the use of the decisions on new equipment, which have been proposed by the organizations and enterprises.

At enterprises, which are planned to operate at a loss, the deductions are made at the expense of the saving which has been obtained from the decrease of the losses as a result of the introduction of new equipment.

1.2. The deductions from the additional profit, which was actually derived by the enterprises of their own or other ministries (departments) due to the incentive markups on the wholesale prices for new highly efficient products for production engineering purposes, which correspond in their parameters to the best domestic and foreign examples, and for products with the State Emblem of Quality. The deductions are made over the entire term of effect of the indicated markups.

1.3. The assets which are included by a separate line in the estimated cost of the work on new equipment:

1.3.1. For work, the economic impact from the use of the results of which at the enterprises of their own or other ministries (departments) does not take the form of a profit from the actual decrease of the production cost or an additional profit from the markups on the wholesale prices.

1.3.2. For work, the results of the use of which do not take the form of an economic impact.

There can be grouped with this work:

--work on the protection of the environment and natural resources, the improvement of working conditions and labor safety practices;

--the development of sectorial, subsectorial, and territorial automated control systems;

--the development of methods, standards, norms, and specifications on the use of manpower, material and technical, and financial resources and fixed capital, the appraisal of their use, as well as the conducting of technical and economic, patent and license, and market research, when the indicator work is performed in conformity with assignments of the state plan of economic and social development or the plans of ministries (departments);

--scientific research in the area of scientific and technical information, metrology, and invention.

1.3.3. The specific list and amount of work, which is indicated in Paragraph 1.3 of this Statute, for each organization (enterprise), as well as accordingly the standard of the deductions for the incentive funds or the amount of incentive assets, which are included in the estimated cost of each job, are approved by the ministry (department). In this case for the ministry (department) as a whole the amount of such work should not exceed 20 percent of the annual amount of scientific research, design, technological, and other work on new equipment.

2. For each job the deductions are made in accordance with only one of the sources which are indicated in Paragraph 1 of this Statute.

2.1. The deductions for the incentive funds of organizations (the material incentive fund and the fund for sociocultural measures and housing construction) and the material incentive fund of enterprises for work, for which incentives are given in conformity with Paragraph 1.1 of this Statute, are made in accordance with the standard in the amount of 15 percent of the amount of the obtained economic impact. (Footnote 3) (In instances, when in the sector the actually prevailing standard of deductions is less than the established standard, the ministries and departments can make up the lacking assets for the deduction for the incentive funds of organizations and enterprises by means of the reserve of the ministry (department) for incentive funds)

The deductions in the full amount of the standard are made for the development of new equipment, which in accordance with the most important indicators corresponds to the world technical and economic level. For the development of new equipment, the most important indicators of which exceed this level, the standard is increased. For the development of equipment, which does not satisfy the indicated requirements, the standard of deductions is reduced by not less than 50 percent.

The specific standard and the amount of the deductions are established in the supply order (contract) for the performance of work subject to the technical

and economic level, novelty, national economic significance, and efficiency of the new equipment. In this case the total amount of the deductions for the sector as a whole as a percentage of the amount of the economic impact from the performed work should not exceed 15 percent.

The deductions are made in accordance with the established standard over the course of 3 years from the beginning (the month) of the introduction of the new equipment. Given an established standard (planned) term of the assimilation of new equipment the deductions are made from the moment of its expiration.

In case of the shortening of the established standard or planned terms of the performance of development and the assimilation of its results in production the duration of the period of the deductions for the corresponding funds is lengthened with the permission of the ministry (department) by the time of the achieved shortening.

The amount of the deductions during the 1st year is determined on the basis of the amount of the obtained annual economic impact, while in subsequent years on the basis of its increase as compared with the preceding year. Accordingly in the plan on the profit (on the decrease of the production cost) during the 1st year of the introduction of new equipment the total amount of the additional profit (the decrease of the production cost) is reflected, while in subsequent years its increase (the additional decrease) as compared with the preceding year is reflected.

With the permission of the ministry (department) in case of the development and introduction of new equipment of custom and small-series production the deductions can be made over the course of 2 years, on the basis of the annual economic impact, which has been calculated in accordance with the actual volume of output of the product during the 1st and 2d years from the start of the introduction of the new equipment in production. In this case in the plan on the profit the decrease of the product cost (the cost of the work being performed) during the 1st and 2d years of introduction of the new equipment is determined as compared with the base year.

The deductions are specified in the financial plans of the enterprises. For the actually obtained above-plan impact the deductions are made at the expense of and within the limits of the actually derived above-plan profit (the above-plan decrease of the losses) of the enterprise.

The economic impact is taken into account by the USSR State Planning Committee within the total profit which is approved for the ministries and departments. In case of the approval of the annual plans for enterprises the ministries and departments take this impact into account in the total profit of the enterprise.

The deductions are made after the approval in accordance with established procedure of the certificate on the introduction (use) of the results of the performed and accepted work.

2.2. The deductions for the economic stimulation funds of organizations and enterprises with respect to the work, for which incentives are given in conformity with Paragraph 1.2 of this Statute, are made in the amount of up to 70 percent of the additional profit, which was actually derived due to the incentive markups on the wholesale prices for products for production engineering purposes. The remainder of the additional profit is distributed in equal parts between the unified fund for the development of science and technology and the state budget.

2.3. The amount of the assets, which are included in the estimated cost of each job, is determined in the following manner:

--in conformity with Paragraph 1.3.1 of this Statute (for channeling into the incentive funds of organizations and the material incentive fund of enterprises)--in accordance with the standard in the amount of 15 percent of the amount of the guaranteed economic impact, (Footnote 4) (The guaranteed economic impact is the anticipated economic impact, on which the developer has gotten agreement with the client (the user of the results of development) and which has been calculated on the basis of the specific efficiency of the new equipment, which is guaranteed by the developer, and the extent of its introduction, which is guaranteed by the client) which is revised after the acceptance and evaluation of the results of the performed work. In this case the indicated standard is differentiated in conformity with Paragraph 2.1 of this Statute.

--in conformity with Paragraph 1.3.2 of this Statute (for channeling into the material incentive fund of organizations and enterprises)--in consultation with the client of the work subject to its importance, novelty, and labor intensiveness. The deductions are specified in the supply order (contract) for the performance of work. In this case the maximum amount of these assets should not exceed 20 percent of the wage fund, which has been calculated for the period of development, which has been established by the plan, in accordance with the salaries and wage rates of the immediate participants in the work. The indicated assets are transferred to the developer after the positive evaluation and acceptance by the client of the performed work.

2.4. In case of the exceeding of the established terms of the fulfillment of the work the contributions to the incentive funds in conformity with Paragraphs 1.1 and 1.3 of this Statute are reduced by not less than 50 percent.

3. In those instances, when the work on new equipment is performed by several organizations and enterprises, the distribution of the total amount of assets, which are deducted in conformity with Paragraph 1 of this Statute for the funds of the organizations and enterprises which are participants in the work, is carried out among them in conformity with the proportionate participation, which is determined subject to the amount, complexity, and type of work being performed. In this case from 30 to 50 percent of the indicated assets are allocated for the performance of work on the assimilation and the organization of the production of new equipment.

The specific amount of the assets, which are due to each of the participants in the work (including the organizations and enterprises, which have not been converted to the cost accounting system of the organization of work on new equipment), is specified in the supply order (contract) for the performance of the work. After the introduction (acceptance) of the performed work the amount of these assets is revised.

The disagreements on the distribution of the assets among the participants in the work are resolved by their superior organizations, and, if necessary, by the USSR State Committee for Science and Technology.

4. A centralized bonus fund for the development, assimilation, and introduction of new equipment is formed in the ministries (departments).

Organizations and enterprises transfer to the fund not more than 20 percent of the assets, which are channeled in conformity with proportionate participation for the formation of the economic stimulation funds in conformity with Paragraphs 1.1, 1.2, and 1.3.1 of the Statute, prior to their allocation to these funds. The specific amounts of the deductions for the centralized bonus fund are established by the ministries (departments).

In the instances, when the performer and coperformers of the work are subordinate to the same ministry (department), the deductions for the centralized bonus fund of the ministry (department) can be made by the enterprise from the total amount of the assets, which are intended for channeling into the funds of the participants in the work in conformity with Paragraphs 1.1 and 1.2 of this Statute, prior to its distribution in accordance with proportionate participation. In this case the other participants in the work do not carry out the transfer of assets to the indicated fund.

5. Of the assets, which have been placed at the disposal of the organization in conformity with Paragraphs 1.1 or 1.3.1 of this Statute, not less than 40 percent are channeled into the fund for sociocultural measures and housing construction. (Footnote 5) (In the organizations, in which a fund for sociocultural measures and housing construction is not established, these assets are used for sociocultural measures)

Of the assets, which have been placed at the disposal of an organization or enterprise in conformity with Paragraph 1.2 of this Statute, not less than 30 percent are channeled into the fund for sociocultural measures and housing construction and 10 percent into the development fund.

The assets, which are left after the indicated deductions, as well as the assets, which have been placed at the disposal of the enterprise in conformity with Paragraph 1.1 or 1.3.1 and at the disposal of an organization or enterprise in conformity with Paragraph 1.3.2 of this Statute, are channeled entirely into the material incentive fund.

6. In the instances, when the time of the development and industrial assimilation (introduction) of new equipment exceeds 2 years, the giving of incentives to the participants in the work (including organizations and

enterprises, which have not been converted to the cost accounting system of the organization of work on new equipment) can be carried out as an advance at the expense of the assets of the centralized bonus fund of the ministry (department) which is the client of the development.

The amount of the advance is determined with respect to the scientific and technical development as a whole and should not, as a rule, exceed 30 percent of the assets, which are intended for channeling into the material incentive fund of the organization or enterprise.

For work, which is aimed at the development of new equipment which in the most important indicators will correspond to or exceed the world scientific and technical level, the amount of the advance can be increased to 50 percent.

The amount of the assets, which are intended for the giving of incentives in the form of an advance, is paid in conformity with the proportionate participation in the fulfillment of the work, while the procedure of transferring the assets is established by the ministry (department).

The organization (enterprise), which is the developer, includes the assets, which are intended for the giving of incentives in the form of an advance, in the material incentive fund.

The assets for the giving of incentives in the form of an advance, which have been paid to organizations and enterprises, are returned for the compensation of the corresponding centralized bonus fund at the expense of the assets, which are intended for inclusion in the material incentive fund of these organizations and enterprises.

7. There are also channeled into the material incentive fund of organizations and enterprises, in addition to the assets indicated in Paragraph 1 of this Statute:

--the assets which are allocated by the ministry (department) from the centralized bonus fund for the development, assimilation, and introduction of new equipment;

--the assets (in the portion intended for material incentives), which are received in accordance with contracts for the transfer of the results of the scientific and technical developments to enterprises and organizations of other ministries (departments) and for the giving of assistance to them in the use of advanced know-how in conformity with Decree No 604 of the USSR Council of Ministers of 27 August 1971;

--a portion of the amounts of the temporary markups on the prices for new consumer goods of improved quality in conformity with the prevailing procedure;

--the assets received in the form of bonuses with respect to competitive designs (research and development);

--the assets in accordance with other prevailing statutes in conformity with the established procedure of their formation and use.

7.1. The assets, which are transferred from the corresponding funds of other organizations and enterprises in case of the joint fulfillment of all-union scientific and technical programs in conformity with Paragraph 15 of the Decree No 814 of the CPSU Central Committee and the USSR Council of Ministers of 18 August 1983, are also channeled into the incentive funds of organizations and enterprises.

8. The development fund of the organization is formed by means of:

--the assets, which are included by a separate line in the estimated cost of the work, which is performed on the basis of economic contracts and supply orders, in the amount of 1.5 percent of the guaranteed annual economic impact from the use of new equipment in the national economy (at the client's), the obtaining of which the organization that is the developer guarantees, but not more than 6 percent of the estimated cost of the work. Upon the acceptance by the client of the work the amount of the annual economic impact is revised. The indicated assets are specified in the estimated cost of the work, the guaranteed economic impact from the use of the results of which in the national economy exceeds by twofold and more its estimated cost;

--75 percent of the amount of the excess of the revenues over the expenditures (the profit) with respect to scientific research, design, and technological work, which is performed in accordance with economic contracts and supply orders. The calculation of the excess of the revenues over the expenditures (the profit) is made in conformity with the prevailing statute within the limits of the actual balance sheet profit;

--the assets which were received from the sale of surplus and retired property, which is counted as fixed capital, less the expenses connected with its sale;

--the assets which were received due to incentive markups in conformity with Paragraph 5 of this Statute;

--the assets, including in foreign currency, which were received from the sale of licenses for inventions which were made at the given organization.

9. The calculation of the economic impact, which is obtained as a result of the performance of work on new equipment and is used for the determination of the amounts of the deductions for the economic stimulation funds, is made in conformity with the Method of Determining the Economic Efficiency of the Use in the National Economy of New Equipment, Inventions, and Efficiency Proposals, which was approved by Decree No 48/16/13/3 of the State Committee of the USSR Council of Ministers for Science and Technology, the USSR State Planning Committee, the USSR Academy of Sciences, and the State Committee for Inventions and Discoveries attached to the USSR Council of Ministers of 14 February 1977, with the subsequent additions to and clarifications of it and the sectorial (subsectorial), intersectorial, and special methods (instructions), which were elaborated on its basis.

The calculation of the economic impact from the production and use of new equipment is made by the main developer and is submitted for approval to the client (user) of the development in the manner which is established by the ministry (department), to which the given client (user) is subordinate. The client (user) of the development is obliged within a 2-month period to reach an agreement on the economic impact, while in case of the refusal to reach an agreement to report to the performer within the same time valid reasons for the refusal.

The disagreements between the parties on the calculations of the economic impact are reviewed by their superior organizations, and in necessary cases a final decision is made by the USSR State Committee for Science and Technology.

The calculations of the impact, which exceed 2 million rubles, are liable to mandatory submission for approval to the USSR State Committee for Science and Technology and are legally registered in the manner specified by Letter No 31-2/135 of the USSR State Committee for Science and Technology of 27 December 1982.

10. Unified economic stimulation funds, into which assets are channeled in conformity with this Statute and the Basic Principles of the Formation and Use of the Economic Stimulation Funds of Design and Surveying Organizations, which were approved by the USSR State Planning Committee, the USSR State Committee for Construction Affairs, the USSR Ministry of Finance, and the USSR State Committee for Labor and Social Problems on 30 September 1985, No LB-47-D, are formed at the organizations, at which there are design and surveying sections.

11. The procedure of the channeling of assets into the economic stimulation funds of organizations and enterprises for work on new equipment, the coordination of the calculations of the economic impact, and the drawing up of the advance and the forms of the corresponding documents are specified by the ministry (department).

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[Text] The Use of the Funds

12. The centralized bonus fund of the ministry (department) for the development, assimilation, and introduction of new equipment is used:

--for the giving of incentives to the workers of organizations and enterprises for the performance of basic, theoretical, and research work;

--for the increase of the amounts of the assets, which are allocated for the giving of incentives to workers for the development, assimilation, and introduction of fundamentally new highly efficient equipment and technology, the fulfillment of the assignments of scientific and technical programs, and the development of equipment which is intended for delivery for export or the replacement of imports;

--for the payment of bonuses to the winners of prizes of the USSR Council of Ministers in accordance with established procedure;

--for the payment of one-time special bonuses to designers, process engineers, and scientists for the development and assimilation of fundamentally new equipment and advanced technology in conformity with Decree No 462 of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions of 22 May 1985;

--for the payment of one-time bonuses of USSR ministries (departments) and the councils of ministers of the union republics for the development and assimilation in production of highly efficient equipment, advanced technology, and new materials in conformity with the Model Statute, which was approved by the USSR State Committee for Science and Technology, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, and the All-Union Central Council of Trade Unions of 15 November 1984, No 50-9/381;

--for the payment of bonuses to collectives of associations, enterprises, and organizations for the exceeding in the machines, equipment, and instruments, which have been delivered by the client (user), of the rated technical and economic indicators in conformity with the Model Statute, which was approved by the USSR State Committee for Science and Technology, the USSR State Committee for Labor and Social Problems, and the All-Union Central Council of Trade Unions of 25 December 1984, No 40-7/337;

--for the payment of bonuses to the winners of and the giving of incentives to the participants in competitions and public reviews of works, which are connected with the development, assimilation, and introduction of new equipment, as well as for the increase of the bonuses and awards to the winners of the socialist competition, who achieved high results in the area of the development of science and technology;

--for the payment of advances for the giving of incentives for developers in instances, when the period of the development and industrial assimilation (introduction) of new equipment exceeds 2 years;

--in other directions of the giving of incentives to workers of organizations and enterprises for work on new equipment, which are specified by the ministries (departments).

The amounts and the procedure of the transfer of the assets of the centralized bonus fund to the material incentive fund of organizations and enterprises are established by the ministries (departments).

The assets of the centralized bonus fund are not liable to confiscation. The unused assets are spent during subsequent periods.

13. The assets of the economic stimulation funds (the material incentive fund, the fund for sociocultural measures and housing construction, the development fund) of the organization are used in accordance with the estimate. The drafts of the estimates of the expenditure of the assets of the indicated funds are submitted for discussion by the labor collective and after

their endorsement are approved by a joint decision of the administration and the trade union committee and are attached to the collective contract. The administration and trade union committee inform the workers about the execution of the indicated estimates within the time envisaged by the collective contract.

14. When drawing up the estimate it is recommended to use the assets of the material incentive fund of the organization, including the balances of the fund of the past year, in the following basic directions:

14.1. For the payment of bonuses to the workers who directly participate in the development, assimilation, and introduction of new equipment.

Here, as a rule, not less that 50 percent of the assets, which enter the material incentive fund, including in the form of an advance, are allocated for the indicated payment of bonuses.

14.2. For the payment of bonuses to management personnel and the personnel of the administrative staff of the subdivisions of the organization.

14.3. For the payment of bonuses in accordance with the results of the socialist competition within the organization and in accordance with the results of reviews and competitions, which are aimed at the increase of the efficiency of the work of the organization.

14.4. For the giving of one-time incentives to individual workers for the fulfillment of especially important assignments, which can be carried out both in the form of a monetary reward and in the form of gifts.

14.5. For the payment of a reward to workers for the overall results of the work in accordance with the results for the year.

In case of the fulfillment and exceeding of the annual thematic plans or the plans on new equipment, in addition to the assets which have been designated in accordance with the estimate for this purpose, the net surpluses of assets with respect to other items of the estimate of the material incentive fund can also be channeled into the increase of the amounts of the reward of all categories of workers for the overall results of the work of the organization in accordance with the results for the year.

In case of the nonfulfillment of the annual thematic plans (the plans on new equipment) the reward in accordance with the results of the work for the year is not paid to the workers who are to blame for this, and is paid in reduced amounts to the other workers. The reduction of the amounts of the payments of the reward in accordance with the results of the work for the year should be carried out as compared with the planned sums which are envisaged for these purposes in the estimate of the expenditure of the indicated fund. In this case the planned sums of the reward, which are envisaged by the estimate, as a rule, are reduced in proportion to the overall decrease of the planned material incentive fund in connection with the nonfulfillment of the plan.

The procedure and terms of the payment of the reward for the overall results of the work in accordance with the results for the year are approved by the manager of the organization in consultation with the trade union committee with allowance made for the recommendations of the USSR State Committee for Labor and Social Problems and the All-Union Central Council of Trade Unions.

14.6. For the provision of one-time assistance to workers.

It is recommended to distribute the assets for the provision of one-time assistance among the individual categories of workers in proportion to the corresponding planned wage fund or the number of workers of each category.

14.7. For the paying of workers for regular leaves in the area, which corresponds to the share of their wage, which is paid at the expense of the material incentive fund, and the rayon coefficients for the bonuses, which are credited from this fund.

14.8. For the giving of incentives to the workers who are on the registered staff: the members of volunteer public order squads, members of the People's Control, members of volunteer fire-fighting squads.

15. The assets of the material incentive fund of the organization are used in conformity with the statute, which has been drawn up on the basis of the prevailing Model Statute on the Payment of Bonuses and has been approved by the manager of the organization in consultation with the trade union committee.

In this case the material incentive fund can be used for the giving of incentives to workers, including workers not on the registered staff of the organization, in conformity with special decisions of directive organs.

A portion of the assets of the material incentive fund can be transferred to the fund for sociocultural measures and housing construction for use for the construction of apartment houses and children's preschool institutions. The decision on the transfer of the indicated assets is made by the manager of the organization jointly with the trade union committee.

The assets, which have entered in conformity with this Statute the material incentive fund of the enterprise, are used in conformity with the statute, which has been drawn up on the basis of the Model Statute on the Payment of Bonuses, which is in effect in the sector, and has been approved by the manager in consultation with the trade union committee.

16. When drawing up the estimate it is recommended to use the assets of the fund for sociocultural measures and housing construction of the organization, including the balances of the past year, in the following basic directions with allowance made for the solution of the priority social problems of the labor collectives:

16.1. For the construction (the sharing in the construction), expansion, and capital repair of apartment houses and dormitories, children's preschool institutions, dispensaries, dining rooms and snack bars at organizations,

clubs, palaces of culture, Pioneer camps, vacation homes, vacation hotels and sanatoriums, tourist and suburban vacation centers, preventive medical institutions, boarding houses for labor veterans, sports facilities, and other facilities for cultural, personal, and health improvement purposes, as well as for the acquisition of inventory, equipment, specialized means of transportation for the indicated facilities (for example, medical vehicles, portable film projectors), and so on.

In this case it is recommended to the labor collectives of the organization to increase constantly the proportion of the assets of the fund for sociocultural measures and housing construction, which is channeled into the construction of apartment houses and children's preschool institutions.

The allotment of plots of land and the inclusion in the plans of work of subordinated organizations of assignments on the designing and construction of apartment houses, dormitories, and children's preschool institutions, which are implemented at the expense of the assets of the fund for sociocultural measures and housing construction of organizations, are ensured by the executive committees of the soviets of people's deputies in a priority manner.

All the living quarters in houses, which have been built at the expense of the assets of the fund for sociocultural measures and housing construction of organizations, are made available to the workers of these organizations in accordance with the list, which is approved by a joint decision of the administration and the trade union committee, with the subsequent notification of the executive committee of the soviet of people's deputies.

In the houses, which have been built by the executive committees of soviets of people's deputies at the expense of the assets of the fund for sociocultural measures and housing construction of organizations by way of sharing, these organizations allot to the executive committee up to 6 percent of the living space for the resettlement of citizens from houses, which to be demolished in connection with the allotment of plots of land for housing construction, and up to 2 percent for the making of work space available to the workers who are directly engaged in the maintenance and operation of the available housing.

The living space in the houses, which have been built by way of sharing, is made available to the organizations, which participate in the indicated construction, to the executive committees of soviets of people's deputies, and to the economic organizations, which are the sole clients for the construction of apartment houses, during the year for which their placement into operation is envisaged.

As a rule, 9-10 percent of the fund for sociocultural measures and housing construction of the organization can be used for the partial reimbursement of the costs on the economic maintenance of facilities for cultural, personal, and health improvement purposes and Pioneer camps.

16.2. For the implementation of health improvement measures, including the acquisition of medicines for preventive medical institutions which are carried on the balance sheet of the organization, passes to vacation homes, vacation hotels, and sanatoriums, tourist centers and routes through the territory of

the Soviet Union (without payment for travel before the start and after the completion of the route), excursions and trips over local routes on the day off, which are organized by tourist and excursion institutions of trade unions.

The indicated passes, which have been purchased at the expense of the assets of the fund for sociocultural measures and housing construction, are made available first of all to the leading workers of the organization in accordance with a joint decision of the administration and the trade union committee.

Passes for vacation and treatment can be allocated at the expense of the assets of the fund for sociocultural measures and housing construction to participants in the Great Patriotic War, labor veterans and invalids, who previously worked at the organization, but at present are retired and are not on the registered staff of the given organization.

In this case the making of passes available to workers at the expense of the assets of the fund for sociocultural measures and housing construction to vacation homes, sanatoriums, vacation hotels, tourists centers, and routes is carried out as applied to the prevailing procedure and terms of the issuing of passes to workers at the expense of the assets of state social insurance, and of passes for excursions and trips over local routes on the day off as applied to the prevailing procedure and terms of the issuing of passes at the expense of the assets of the trade union budget, that is, with the payment of 30 percent of the cost of excursions and trips by the workers and the members of their families.

In instances, when the organizations do not have Pioneer camps, as an exception, in case of the shortage of assets of state social insurance and the trade union budget, they can acquire at the expense of the assets of the fund for sociocultural measures and housing construction passes to Pioneer camps from other enterprises and organizations for the children of their workers. The payment made by the parents for the indicated passes is transferred to the fund for sociocultural measures and housing construction.

16.3. For the repayment of bank credits, which were granted for the construction of apartment houses and facilities for social, cultural, and personal purposes, and the payment of interest for the use of credits, as well as for the repayment of the credits (up to 25 percent), which were obtained by the organization for the development of subsidiary farms.

16.4. For the performance of cultural, educational, physical cultural, and sports work, the leasing for these purposes of buildings and sports facilities, the acquisition of educational and visual aids, means of propaganda and artistic arrangement, theater costumes (the payment for their renting) for participants in amateur artistic activity, sports uniforms and equipment, as well as the decoration of buildings for holidays and the making up of columns of marchers (within the established norms).

16.5. For the decrease of the cost of food at dining rooms and snack bars of the organization, as well as for the fortification of the diet of workers, who

are undergoing a course of treatment at dispensaries, and children, who are in kindergarten, nurseries, Pioneer and health improvement camps of the organization.

The decrease of the cost of food at the expense of the assets of the fund for sociocultural measures and housing construction is achieved by the transfer of assets of the indicated fund for the payment of a portion of the cost of food upon presentation of the bill of the dining rooms which serve the organizations. The cheaper food should be made available to the workers of the organization, who are employed mainly in sections with harmful working conditions, in accordance with the list which is approved by a joint decision of the administration and the trade union committee.

The managers of the organization in consultation with the trade union committee can allocate free of charge to the public dining enterprises of category III, which serve their workers, the necessary transport or reimburse them for the actual expenses for the transportation of products and prepared food, as well as reimburse the indicated public dining enterprises for the expenses, which are connected with the service of workers at an unusual time, and on the delivery of food to the workplaces and its distribution, with the attributing of these expenses to the assets of the fund for sociocultural measures and housing construction.

16.6. For the expenses on the construction of roads and a water main, electrification, and other work on the improvement of collective gardens within the limits of 25 percent of the estimated expenditures on the performance of this work.

16.7. For the making of nonreturnable material assistance available for the down payment of its own assets for cooperative and individual housing construction, as well as for the partial repayment of the credit which was granted for cooperative and individual housing construction.

The decision on making the indicated assets available to workers is made jointly by the administration and the trade union committee in consultation with the labor collective.

16.8. For the making of interest-free loans available to young families for the improvement of housing conditions or the setting up of a household.

16.9. For other purposes, which are envisaged by the measures on the social development of the labor collectives.

17. When drawing up the estimate it is recommended to use the assets of the development fund of the organization, including the balances of the fund of the past year:

17.1. For the acquisition of scientific and special equipment, instruments, apparatus, inventory, materials, specialized means of transportation, and construction and road machinery.

17.2. For the reimbursement of the expenditures, which are connected with the construction, expansion, renovation, restoration, and repair of buildings, structures, blocks, and other capital for production purposes, the mechanization and technical overhaul of heating and ventilation systems and nature conservation facilities, and the connection to centralized sources of heat, electric power, and gas supply.

17.3. For the development, retooling, and renovation of the pilot (experimental) base of the organization and the increase of its supply with the necessary equipment.

17.4. For the mechanization and automation of labor, the improvement of the technical supply of workplaces with computer and office equipment.

17.5. For the reimbursement of the expenditures on the scientific organization of labor and other measures on the improvement of the quality of work.

17.6. For the performance of work on the organization and development of subsidiary agriculture: the acquisition of agricultural machinery and devices, livestock, poultry, a seed fund, as well as the performance of construction and installation work in the amounts envisaged by the estimate. In this case up to 10 percent of the assets of the development fund of the organization can be allocated for the indicated purposes.

17.7. For the repayment of the bank credits, which were issued for measures which are being implemented at the expense of the development fund of the organization, as well as the interest for the use of these credits.

17.8. For other measures on the strengthening and development of the material and technical base of the organization.

18. The specific directions of the use of the fund for sociocultural measures and housing construction and the development fund are specified by the administration of the organization jointly with the trade union committee.

In this case the assets of the fund for sociocultural measures and housing construction, which were not used during the past year, can be allocated by the organizations for the financing of the exceeding of the work and expenditures on the construction of apartment houses and children's preschool institutions, as well as for the construction of newly begun facilities given the availability of assets and material and technical resources, which ensure the completion of construction in the standard time.

19. The assets of the fund for sociocultural measures and housing construction can be accumulated by the organizations for the carrying out of construction in subsequent years, while the assets of the development fund can be accumulated for the implementation of measures on the strengthening and development of the material and technical base of the organization.

The assets of the development fund of the organization are kept and used at the institutions of banks, which carry out the financing of capital

construction. For the use of the temporarily idle assets of this fund the bank pays the organizations interest in the amount of 0.5 percent per annum.

20. In case of a shortage of assets of the development fund and the fund for sociocultural measures and housing construction bank credit is made available to the organizations within the limits of the plan of long-term credit extension with the condition of its repayment at the expense of the assets of these funds within the time established for this type of expenditures.

20.1. In case of a shortage of assets of the fund for sociocultural measures and housing construction long-term bank credit is made available to the organizations within the limit of 50 percent of the estimated cost of the construction of apartment houses and facilities for social, cultural, and personal purposes for a term of 2 years. Long-term credit can also be made available for sharing in construction within the limit of 50 percent of the share which is envisaged by the protocol of the transfer of capital investments for the corresponding year between USSR ministries and departments and the councils of ministers of the union republics.

Credit can be made available in those instances, when the impending payments of assets to the fund for sociocultural measures and housing construction, which are being allocated during the year being planned for the financing of noncentralized capital investments, come to not less than 50 percent of the estimated cost of construction or given the availability of these assets in the accounts of the organizations.

21. The organizations draft and approve the plans of the measures, which are being planned for implementation at the expense of the assets of the development fund, and submit to institutions of banks for their financing the appropriate extracts from the indicated annual plans and the approved estimated for the individual types of work and expenditures.

The planning estimates and title sheets for the implementation of the corresponding measures, which are being carried out at the expense of the assets of the development fund and credits, are drawn up by the organizations independently and are approved by their managers. Given an estimate cost of these measures of 0.5 million rubles and more the ministries (departments) review them and make the corresponding decision.

22. The organizations submit to the corresponding ministries (departments) the data on the amounts of capital investments (including for construction and installation work) and proposals on the amounts of contracting work and material resources for the implementation of the measures, which are being carried out at the expense of the assets of the development fund, the fund for sociocultural measures and housing construction, and credits of banks.

The ministries (departments) take into account the capital investments, which are being financed at the expense of these funds and credits of banks, in the full amount as noncentralized capital investments and submit them together with the drafts of the plans of centralized capital investments to the USSR State Planning Committee for consideration when preparing the drafts of the plans.

The ministries (departments) ensure the priority inclusion in the plans of capital construction of the corresponding measures, which are being implemented at the expense of the assets of the development fund of the organizations and facilities for nonproduction purposes, the construction of which is carried out at the expense of the assets of the fund for sociocultural measures and housing construction.

23. When drafting the plans of material and technical supply the ministries (departments) meet in a priority manner and in the full amount the need for material and technical resources for the work, which is being carried out at the expense of the assets of the development fund of the organizations, the assets of the fund for sociocultural measures and housing construction (with respect to the construction of facilities for nonproduction purposes), and credits of banks. The proposals of the organizations on the amounts of capital investments for new construction and on the meeting of the need for equipment and other material resources for this construction are reviewed only after the filling of the orders of the organizations for the indicated resources.

24. The work on the construction of apartment houses and other facilities for nonproduction purposes, which is performed at the expense of the assets of the fund for sociocultural measures and housing construction, and the corresponding measures at the expense of the assets of the development fund of the organizations are carried out both by the contractual method and by using the organizations' own resources.

Starting in 1987 the supply with material and technical resources of the work, which is performed using the organizations' own resources at the expense of the assets of the development fund of the organizations, the fund for sociocultural measures and housing construction, and credits of banks, is to be carried out directly by the territorial organs of the USSR State Committee for Material and Technical Supply in accordance with the orders of the organizations in conformity with the design documents.

The supply with material and technical resources of the work, which is carried out by the contractual method at the expense of the organizations' own assets and credits of banks, is carried out in accordance with the procedure which was established by Paragraph 21 of Decree No 387 of the CPSU Central Committee and the USSR Council of Ministers of 29 April 1984.

25. The organizations can combine the assets of the development fund and the fund for sociocultural measures and housing construction (each separately) with the allocations for the financing of the corresponding centralized capital investments.

26. The organizations and enterprises can transfer the assets of the material incentive funds and the funds for sociocultural measures and housing construction to the scientific research institutions and design and technological organizations of the USSR Academy of Sciences and the academies of sciences of the union republics in case of the joint development and introduction of equipment and technology, which conform in their indicators to

the highest world level, as well as with the permission of the ministry (department) as an exception a portion of the assets of the indicated funds, which are formed by means of deductions of the profit which was derived from the decrease of the product cost, to the associations, organizations, and higher educational institutions regardless of their departmental affiliation, which are participating in the fulfillment of all-union scientific and technical programs.

27. The assets of the economic stimulation funds of the organization are not liable to confiscation. The unused assets of the indicated funds are spent in subsequent periods in conformity with the goals and the procedure, which have been established by this Statute.

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FINANCING OF WORK ON STANDARDIZATION IN SUBSECTOR

Moscow STANDARTY I KACHESTVO in Russian No 3, Mar 86 pp 23-24

[Article by I.N. Sidorov: "On the Experience of the Financing of Work on Standardization in the Subsector"]

[Text] At the enterprises of our subsector the management of the work on standardization and unification is carried out in an organized manner and is governed by the plans of state and sectorial standardization, the coordinating plan of the ministry for the current period, as well as the annual plan on the standardization and unification of enterprises.

The planning of the work on standardization and unification has been assigned to the base scientific research department of standardization of the subsector (BNIOS podotrasli) of the main base organization for standardization (BOS). (Footnote 1) (It is necessary to note that in connection with the fact that in the subsector there are several base organizations for standardization for the types of equipment attached to them, which have their own base scientific research departments of standardization, planning is carried out by groups of enterprise)

As a rule, 2-3 scientific research projects and more than 50 experimental design developments on standardization, including the development of state and sectorial standards, are included in the plan of work of the organization. More than 15 enterprises, which are the performers and coperformers, take part in the fulfillment of the plan. All the general technical experimental design developments are performed by enterprises in accordance with independent technical assignments, which are approved in accordance with established procedure [1].

When drawing up the plan the technical possibilities and specific features of each enterprise are taken into account. The individualized approach to the distribution of the work makes it possible to plan better the activity of the staff members of the enterprise, who are dealing with the questions of standardization and unification.

The timely elaboration and approval of the technical assignment on each theme are a mandatory condition, which ensures punctual planning and reporting. By the beginning of the year being planned the base scientific research

department of standardization of the subsector, having the technical assignments (or their drafts), has the opportunity to calculate tentatively the labor intensiveness of the work on all the themes of the plan on the basis of the empirical statistical time standards and the approved sectorial standards [2]. At the same time, on the basis of the stages and phases of the work, which are envisaged in the technical assignments, for each theme an operational schedule is drawn up, the estimated cost of research and development is determined, and a schedule of expenses with breakdowns by items of expenditures is drawn up. Then, by comparing the labor intensiveness of the work on all the themes of the plan with the operational schedule, the base scientific research department of standardization of the subsector distributes the amounts of work among the enterprises. The plan of work of the base organization for the current year (with the mandatory indication of the estimated cost of research and development by enterprises), which has been drawn up in this way, is submitted for approval to the main organization for standardization in the ministry (GOSM) and is approved in accordance with established procedure [3].

The base scientific research department of standardization of the subsector for the purpose of ensuring the centralized financing of the work draws up unified technical assignments and an operational schedule, which are then submitted for approval to all interested enterprises, as well as the base organization for standardization and the main organization for standardization in the ministry. The base scientific research department of standardization of the subsector is appointed as being responsible for the distribution of finances among the enterprises subordinate to it and the observance of financial discipline on the basis of the economic contracts which are concluded with the enterprises which are the performers and coperformers.

The basis for the opening of financing and the transfer to the enterprises of the necessary amounts, in addition to the economic contract, is: the operational schedule; the estimate of expenditures and the schedule of expenses; the breakdowns of the expenditures on the basic wage, materials, special equipment, and travel expenses; the technical assignments for the entire theme, which have been submitted for approval to the base scientific research department of standardization of the subsector and have been approved by the management.

The centralized financing of work on standardization and unification makes it possible to obtain specific economic advantages and, what is the main thing, ensures "control by the ruble." The experience of financing work on standardization on the basis of the conclusion of economic contracts revealed the following positive aspects:

--the deadlines of the fulfillment of each theme, all the control assignments, and the plan of work as a whole began to be observed better;

--the possibility of the systematic financing of the stages and phases of the work in case of quarterly planning appeared;

--owing to the more correct and uniform norm setting of work its amounts in the estimated cost decreased;

--the differences of the amounts of the expenditures on the performance of similar research and development at different enterprises decreased;

--the opportunity appeared to develop more completely the time standards for the performance of some types of work or others and their individual stages and phases;

--the number of instances of the adjustment of the dates of the work on individual themes, especially the dates of the completion of the work, decreased;

--the efficient monitoring of the stages and phases of the work in accordance with the plan in the base scientific research department of standardization of the subsector on the basis of the actual state of affairs is ensured. (No theme can be stopped and the financing on it is not carried out, if the deadlines of its fulfillment are upset.)

It should be noted that given the method in question of financing work on standardization the opportunity appears to enlist more efficiently in the solution of the problems of the subsector the institutes of the State Committee for Standards, the USSR Ministry of Higher and Secondary Specialized Education, and the USSR Academy of Sciences. Such work experience exists in the sector and has yielded positive results.

Difficulties arise when themes (research and development) on standardization, which have not been envisaged in the plans of work and go beyond the already calculated labor intensiveness, are proposed for fulfillment to enterprises and the base organization for standardization by directive instructions and orders. In this case a solution can be found owing to the inclusion of internal reserves, the shift of the deadlines of the work on the planned theme, or the replacement of some themes by others. In the practical activity of our organization one has occasion to use combined versions.

Working for several years in accordance with the method of the centralized financing of the base scientific research department of standardization of the subsector, the enterprises and base organization for standardization have achieved significant results:

--the control assignments on the level of standardization and unification with respect to all new development for the 11th Five-Year Plan were fulfilled;

--an average coefficient of economic efficiency at the level, which was established for the entire subsector, was achieved;

--52 more standards were elaborated and introduced than prior to the use of the given method;

--more efficient departmental monitoring of the introduction and the observance of the requirements of the standards at all enterprises was ensured;

--time standards were developed and are being used and several sectorial norms [2] of the performance of work on standardization and unification were revised;

--the plans of state and sectorial standardization for the 11th Five-Year Plan were completely fulfilled;

--the total economic impact from the performed work on standardization and unification at all enterprises of the subsector during the years of the 11th Five-Year Plan came to 11.8 million rubles.

The achieved results on the improvement of the system of the centralized financing of work on standardization and unification may be a specific stage of the changeover to the large-scale experiment, which is finding greater and greater dissemination at enterprises of the country. For the complete changeover to cost accounting it will be necessary to do very much more and, first of all, it is necessary to grant full economic independence to and to broaden the rights of the managers of subsectorial standardization services.

Common forms of the plans and reports on the work being performed on standardization and unification are being used in the subsector for the purposes of the more complete utilization of all the advantages and possibilities of centralized financing and the tightening up of the monitoring of the fulfillment of the work on the basis of economic contracts. A common form of the acceptance and delivery of research and development is being used in conformity with the prevailing sectorial standards [3, 4]. A method, which establishes the procedure of planning the work on standardization and unification and specifies individual statutes and regulations, as well as the forms of the documents which are drawn up for the opening of an order, has been developed and is in effect in the subsector.

Having a balanced plan on the labor intensiveness and range of the work, as well as the performers, the base scientific research department of standardization of the subsector carries out the constant monitoring of the fulfillment of all the themes (stages and phases) and ensures their coordination. Here the theme, for example, "Standardization-85," is included in the basic plan of the enterprise for the current year. If this theme, which is being performed in accordance with an economic contract, is not closed by an acceptance and delivery certificate and has actually not been accepted by the base scientific research department of standardization of the subsector, the plan of the enterprise on the basic range of work being performed for the year is not taken into account.

The specific research and development on standardization and unification, as well as their stages and phases, which are envisaged by the technical assignment and the theme "Standardization" for the organization during the current period, are taken into account in the quarterly plans of enterprises.

The monitoring of the fulfillment of the plans of work at enterprises, as well as their individual stages and phases is carried out, as a rule, with the aid of automated systems of the monitoring of fulfillment.

Along with the already noted positive results of the introduction of centralized financing, the role and importance of standardization in the more efficient use of the created scientific and economic potential are increasing to a significant degree. This is contributing at the same time to the timely change of the methods of work, the increase of the production of the final product, and the decrease of labor expenditures.

Prior to the introduction in the practice of enterprises of the subsector of centralized financing and the monitoring of the spending of assets the managers of the developments on each theme of the plan of standardization and unification themselves made the economic calculations and opened orders for financing. Here for the elaboration of standards, which are approximately identical in extent, different amounts of the estimated cost for them were approved. For the fulfillment of similar themes one enterprise spent 5,000 8,000 rubles, while another spent 50,000-60,000 rubles. But if it is taken into account that the total amount of research and development in accordance with the plan of standardization is approaching 100 descriptions, it becomes obvious that it is impossible to track given such a system the efficient and clear expenditure of assets for the performance of the work.

The above-examined method of financing and monitoring the work on standardization does not go beyond the procedure established by law and blends completely with the existing regulations. It also does not violate the procedure of planning, which has been adopted in the sector, and regulates reporting more efficiently, raises to a new level the personal responsibility, as well as the material stimulation of the specialists, who are directly participating in the performance of research and development on standardization and unification.

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HISTORY OF NOVATOR DESIGN, TECHNOLOGICAL ORGANIZATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 14, Mar 86 p 9

[Article by V. Veselov under the rubric: "The Initiative.... Barriers in the Way of Introduction": "What Is the Design and Technological Organization? The Rise and Fall of the Novator Design and Technological Organization"]

[Text] Each year the State Committee for Inventions and Discoveries offers sectors of industry of the country approximately 1,500 inventions. The number of implemented technical ideas is incomparably smaller than this figure. But even in those instances, when a development has been accepted for introduction, a minimum of 5-6 years pass before it begins to yield a return. Usually the time of introduction is even longer, and the reckoning goes on not for years, but for decades.

The path of developments, which are of an intersectorial nature and, consequently, are most valuable, is especially thorny. Moreover, this applies not only to ideas, the implementation of which requires the building of new works or the fundamental renovation of operating works and, hence, also the making of decisions in the top level of management of the national economy. No, departmental barriers often are also nearly insurmountable for comparatively easily implemented developments, which, however, as a whole (and at times also "individually," as, for example, the emulsifiers and units for the fine treatment of technical oils, which were discussed in No 9 of EKONOMICHESKAYA GAZETA) yield an enormous impact. Why? Here is a specific example.

Thus, many sectors are interested in the use of emulsifiers, but some one person, moreover, far from always the one who will receive the most significant impact from the introduction of the innovation, should take upon himself all the troubles and inconveniences, which are connected with the implementation of the idea. Moreover, sometimes precisely the producer needs least of all the implementation of the proposed development, since its entire impact is realized in another sector.

Under these conditions the significance of the "go getting" abilities of the author, personal contacts, and other attendant circumstances, which do not concern the matter in any way, increases inordinately. Truly creative people,

who are completely immersed in their work, are doomed here to defeat from the very start.

It is clear that a specific economic mechanism, which would make the process of the introduction of inventions not only quick, but also natural and void of dependence on random, subjective factors, is needed.

Both we and our friends from the socialist countries have experience in the establishment of such a mechanism.

They proceeded in such a direction in the GER. Here at all the combines (this is the largest production unit) regardless of their specialization capacities were created for the production of so-called means of rationalization. Do not think, however, that these are some minor articles. By means of rationalization there are meant new types of equipment, sets of machines, automated sections, industrial robots, and much more, which was previously produced only at specialized enterprises. In addition to machine building enterprises, shops, and centers, scientific research and design organizations also belong to the combines.

Thus, the scientific and technical potential of the combines enables them to design and produce practically any means which are necessary for the intensification of production.

It is clear that the combines, by having such possibilities, can implement practically any innovative idea on their own, without waiting for either assistance or instructions.

The Schwartze Pumpe Combine, which addressed to the inventor of the cavitation generator, Estonian engineer L. Sulbi, the proposal to organize the production of the machine (for its own needs and on its own), is also, of course, not an exception. As we see, the specialists of the combine are keeping track of the appearance of innovative developments not only in their country, but also beyond it.

A somewhat different approach to the implementation of advanced technical ideas has been adopted in Hungary. A good example in this respect is the activity of the Budapest Institute of Power Engineering (it was told about in greater detail in No 31 of EKONOMICHESKAYA GAZETA for 1983).

The collective of the institute is concerned with the solution of only one problem--the saving of fuel and energy resources. All the developments of the institute are connected with the development and introduction of energy-saving technological processes and equipment, moreover, not in some specific sector, but throughout the national economy of the republic. What kind of developments these are--"their own," which were prepared by staff members of the institute, or "others'," which were proposed by inventors "from outside"--does not play a role, since the work is evaluated according to the end result.

But who will embody the idea in metal? The institute does not have its own production base. Industrial enterprises fill the orders for the production of the necessary equipment in the necessary quantity in a short time.

How does this happen? A number of enterprises of the machine building complex of Hungary are provided in a planned manner with orders in a smaller amount than their production capacities make possible. As a result a certain reserve of capacities, the use of which depends entirely on the initiative of the managers of the enterprises, is formed. Whoever does not display such initiative cannot count on the stability of his position. Therefore, the producer actively seeks a consumer, while the consumer (in this case the Institute of Power Engineering) has the opportunity not simply to place orders, but even to do this on a competitive basis. A contract is also concluded with the enterprise, which has offered the best terms (time, cost, the guarantee of quality).

In the end the client receives a completely finished object, in the development of which he took part only with his own financial assets.

Thus, there are two approaches to the solution of one problem. Obviously, they have both strong and weak points. Our goal is to try to determine how the experience of our friends, which has been used with allowance made for the conditions of our enormous economy, the peculiarities inherent in it, and the difficulties being experienced by it, can be useful. And here I would like to tell about one attempt, when, although in most general outline, in embryo, such an approach to the problem of introduction, which to a certain extent combined both the existing experience and its creative interpretation, appeared.

In 1971 the Novator Design and Technological Organization (KTO) was established in Baku. Its goals and tasks were specified as follows by the decree of the Azerbaijan CP Central Committee, the Azerbaijan SSR Council of Ministers, and the republic Council of Trade Unions: "The introduction and promotion of inventions and efficiency proposals in the area of office equipment, tools, accessories, instruments, machine tools, machines, and other devices, which facilitate labor and increase its productivity."

Novator had all the rights of a legal entity and had a production plan and wage fund. Let us emphasize that this organization did not engage in any activity except scientific production activity. In general, it was an ordinary enterprise.

But further what is ordinary ends and what made the design and technological organization a phenomenon, which to some degree is unique, begins.

Novator is an intersectorial organization. Its doors were open for all enterprises regardless of departmental subordination. Only the very nature of the activity of the design and technological organization and its specialization imposed restrictions. In order to preserve the intersectorial nature of Novator, they included it in the system of the republic Ministry of Municipal Services, which monitored the financial and economic activity of the design and technological organization, but did not have an influence on the scientific production aspect of its work. The solution, perhaps, is not the most successful, but at that time a different one simply was not found.

The departments of the designing and introduction of innovative developments and inventions in machine building and the oil drilling and petroleum refining industry, the Department of Electronics and Precision Mechanics, the Department of Office Equipment and the Scientific Organization of Labor, the Department of the Promotion of Scientific and Technical Achievements, and a production base were a part of the design and technological organization.

Novator had a sales plan in rubles, which was approved for a year. But specifically what the organization did was specified only by the clients, the interests and needs of the user enterprises. The order was the basis of the activity and the very existence of Novator as a completely cost accounting organization. All the work of the design and technological organization was based on the principle of self-sufficiency. Novator did not receive any budget investments for the development of the production base and the conducting of research, design, and introductory development. The design and technological organization earned the necessary assets itself, by performing economic contractual work in accordance with the orders of production workers. And if it were to forget here the way, no one would help to replenish the backlog of orders. For Novator did not have a "master," who could "advise" the enterprises subordinate to it to resort to the services of the design and technological organization. Consequently, every development, which was carried out by the collective of Novator, should have met the most urgent requirements of production and should have been carried out in the shortest possible time and with high quality. Otherwise the organization could have lost its prestige and, along with it, also the assets for the continuation of its activity.

Whose developments were these? More than 70 percent of the ideas, which Novator implemented, originated outside its walls. The design and technological organization was open for all inventors and efficiency experts regardless of where they lived and worked. Everyone could bring here his own development, moreover, at any stage of readiness. If it was promising, the organization took upon itself all the troubles, which were connected with the implementation of the innovative proposal, found a client, and concluded with it a contract on introduction.

But who produced the means of rationalization? Novator made them itself, without resorting to the services of specialized enterprises, the unwavering position of which also served in such cases as the main stumbling block.

How was it possible to create the production base necessary for this? It is here that one of the most curious aspects of the story of Novator lies. Perhaps, it is simplest of all to show it on the basis of a specific example.

The Chelyabinsk Electrometallurgical Combine for a long time experienced great difficulties due to the low quality of graphitized electrodes. Frankly speaking, it was simply impossible to use these electrodes for their proper purpose. They had to be purchased abroad. It is clear that this could not continue forever. What did the management of the combine not do in order to solve the problem! Various institutes were linked up, conferences and even, it seems, "brainstorming sessions" of scholarly men were held. In vain. And here Novator proposed its own development: a new cutting and measuring tool,

which does not have analogues in our industry. Its use made it possible to completely reject imports.

This is just one example, but how many more of them there were, since Novator filled the orders of enterprises, which were located in more than 100 cities of the country, including Moscow, Leningrad, Kharkov, Minsk, Sverdlovsk, and others.

It is clear that the client enterprises, as they say, met the design and technological organization halfway: for, besides this organization, no one did what it did. But Novator needed one thing--equipment. And they sold it--as much as and what they could. But do not think that the clients tore this equipment, as they say, from their heart. They turned over to Novator equipment, which either they did not need or was utilized so little that parting with it did not bring inconveniences.

Thus, the design and technological organization accumulated, in essence, the reserve capacities of enterprises. The very capacities, the lack of which ostensibly also hinders the materialization of innovative developments and inventions. And here is the result: whereas at the moment of its formation Novator received only several units of equipment, after a few years its production base enabled it to fill the orders of the Moscow Frezer Plant and enterprises of Sverdlovsk and Tomsk for the production of automatic lines for the sharpening of hard alloy cutting tools with wheels made from synthetic diamonds, which were developed at the design and technological organization and were the first in Europe.

This once again confirms the assumption about the existence of a reserve of production capacities, which has been expressed for a long time now and in many respects is supported by statistics. And not only confirms, but also indicates a means of if only the partial solution of this problem. Moreover, a natural solution, which stems from the complete coincidence of the interests of individual enterprises and the national economy, which is most valuable and for the present difficult to accomplish.

In general when you are becoming acquainted with the story of Novator, precisely the natural character of both its establishment and development is conspicuous. The design and technological organization emerged from the Office of Technology attached to the republic Council of Innovators in response to the most urgent requirement of the day--to speed up the introduction of scientific and technical developments in production. Resourceful, energetic people who were attracted by the possibility of truly creative work--inventors, efficiency experts, in short, who valued above all else the possibility of participating in the origination and implementation of advanced technical ideas--came to it of their own free will.

However, how all the same was their labor paid for? Novator was by its status a design and technological organization of the second category. The salaries of the engineering and technical personnel were also established in conformity with this. Moreover, in case of the fulfillment by the organization of the plan indicators for the quarter a bonus in the amount of 40 percent of the salary was paid to the specialists. This was envisaged by the statute on the

payment of bonuses, which was approved by the republic Ministry of Municipal Services. On the average the specialists of Novator received 250 rubles each a month. The design and technological organization did not make available to its engineers any other sources of the wage.

From the very start the cost accounting of the design and technological organization became absolutely real and void as well of a trace of formality, since the existence of the organization depended entirely and completely on its clients. But this led to the redistribution of roles in the "producer--consumer" system. The interests of the consumer appeared in the forefront. At last whoever paid the orchestra began to order the music. Therefore, the time of the implementation of developments--from the idea to introduction "turnkey"--was shortened significantly as compared with the usual time, while high quality turned into a condition of work, which goes without saying.

Novator grew and improved not in conformity with any instructions and directives, but according to its own logic of development, which the conditions and goals of its activity dictated. But it, this logic, not only was not at variance with our common goals and tasks, but also completely coincided with them.

Unfortunately, far from all economic organs have been placed in such a position. State interest dictates to them one line of behavior, while local, departmental interest dictates another, frequently diametrically opposed line. For this reason the value of the forms of our economic life, to which initiative has given rise and which helped to overcome such a contradiction, is so great.

The Basic Directions, which envisage the establishment of intersectorial scientific and technical complexes for the development and introduction of new equipment and technology, are aimed at this. Depending on their nature and goals such complexes, obviously, can (and inevitably should) differ somehow from each other. Novator gives an example of one of the possible approaches to the solution of the problem of introducing intersectorial developments. More precisely, it gave an example, for today the Novator Design and Technological Organization does not exist.

It is simply impossible to call its "demise" natural. First they prohibited the organization from accepting orders for the implementation of scientific and technical developments from enterprises located outside Azerbaijan. Such a decision was explained by the concern for the needs of industry of the republic, which first of all Novator should meet. The reason is as if serious. But the whole point is that the design and technological organization did not once during its existence refuse to fill the orders of any local enterprise. Moreover, Novator itself actively offered its assistance in the introduction of technical innovations. However, the majority of enterprises did not respond to the appeals. Therefore, the ban on the conclusion of contracts with "outside" clients in no way contributed to the increase of the influx of orders from "one's own" clients. The sharp decrease of the orders for the development and introduction of new equipment was the only result, which dealt a heavy blow to Novator.

In 1982 the design and technological organization was brought under the subordination of the republic State Planning Committee and began to be called the Production Center for the Introduction of the Achievements of Science, Technology, and Advanced Know-How. Not only the name was changed. The center actually ceased to perform work with inventors, having switched to the implementation of the developments of republic academic and sectorial institutes, although many of them have their own pilot experimental base. Last year only six design developments were implemented. The center is not coping with its plans.

In the next year or two the center is to get a new production base, the construction of which is under way in the industrial zone of Baku. It will be furnished with the latest equipment. Now is the right time to think about the status of the introducing organization, so that it would preserve everything valuable that the experience of Novator gave.

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TRAINING OF SCIENTIFIC PERSONNEL IN WESTERN UKRAINE

Moscow TEKHNIKA I NAUKA in Russian No 2, Feb 86 pp 38-40

[Interview with Academician of the Ukrainian SSR Academy of Sciences Ya.S. Podstrigach, chairman of the Western Scientific Center of the Ukrainian SSR Academy of Sciences and director of the Institute of Applied Problems of Mathematics and Mechanics, by TEKHNIKA I NAUKA correspondent I. Tsygelnyy under the rubric "The Management of Scientific and Technical Progress": "The School--the Higher Educational Institution--the Academic Institute--the Plant"; date, place, and occasion not given; first paragraph is TEKHNIKA I NAUKA introduction]

[Text] Scientific and technical progress has become a command of the age, and that is why the training of skilled scientific and technical personnel has acquired a special role. Interesting experience of work in this direction has been gained in the western oblasts of the Ukrainian SSR. In this connection our correspondent I. Tsygelnyy addressed to Academician of the Ukrainian SSR Academy of Sciences Ya.S. Podstrigach, chairman of the Western Scientific Center of the Ukrainian Academy of Sciences and director of the Institute of Applied Problems of Mathematics and Mechanics, the request to tell how the problems of training scientific and technical personnel are being solved here.

Ya.S. Podstrigach. Let us ask ourselves the question: there are institutions which have been proven by life: the school, the vocational and technical school, the higher educational institution, graduate studies, degree seekers, special students, diverse courses for the improvement of skills--what else is necessary? Use them! If an engineer is needed, give an order to the Ministry of Higher and Secondary Specialized Education, and in a year or two you will get newly graduated specialists, for example, in mechanics. If candidates of sciences are needed, make an announcement on admission to graduate studies.

Unfortunately, everything is going not as smoothly as one would like.

We receive through assignment, for example, five young specialists, but two of them according to their data are entirely unsuited for the institute. And, what is the most unpleasant thing, this comes to light when the "young" specialist is already nearly 30. It is a personal tragedy: the best creative years of a person have passed irretrievably. In another area of activity he would achieve more.

And for the scientific institution this process takes place painfully. After all, as a rule, there are no vacancies. Hence, having taken an unsuitable person, we, first, have barred the way of needed specialists and, second, have not coped with the corresponding section of the work.

And we decided: let us form a goal-oriented arrangement of the training of the specialist in a form of a system: the school--the higher educational institution--the academic institute.

But when its introduction began, it turned out that life requires another unit of production, and now this chain appears as follows: the school--the vocational and technical school--the higher educational institution--the academic institute--the plant.

Correspondent. But how is all this being accomplished in practice?

Ya.S. Podstrigach. Well, for example.... We are training for industrial enterprises skilled personnel directly. For example, our Candidate of Physical Mathematical Sciences M. Novosad is successfully working at a conveyor building plant. However, the question is being examined much more broadly. The Institute of Applied Problems of Mathematics and Mechanics of the Ukrainian SSR Academy of Sciences is being reinforced by young people mainly from universities of the country and for the most part by graduates of Lvov State University, at which over the decades a system of the training of mainly science teachers was formed. They gave the students an education sooner in breadth than in depth, and when such a graduate ended up not in a teaching job, he found himself faced with the need for a cardinal change of approach. At the enterprise and the scientific research institute he began to retrain. This period of adaptation lasted about 4 years.

So that it was necessary to begin with the university.... We got in touch with the directors of the mathematics faculty (the basic contingent of graduates comes to us precisely from there), had a discussion with them.... As a result the council of the faculty decided to conduct the separate training of mathematics specialists of the scientific teaching type and the scientific production type.

Correspondent. That is, were there singled out for the first time the groups of students, who after graduation had to work at scientific research institutes, design bureaus, and industrial enterprises?

Ya.S. Podstrigach. Yes, precisely that. We set for ourselves the task to eliminate from the period of formation this notorious time for adaptation and began to train specialists purposefully starting with the 3d and 4th year, and at times with the school years (I will tell about this a little later). We included the students in the work on our specific scientific and introducing themes, enlisted them in conferences for young scientists, invited them to give reports at the seminars of the departments, and so forth. The joint chair of the mathematical modeling of physical mechanical processes of our institute and Lvov University became the organizational basis of this work. It is important to note that at the same time in Lvov Oblast interdepartmental

complexes and associations began to be established as a voluntary service (TEKHNIKA I NAUKA wrote about them recently, in No 6 for 1985). At them scientists and engineers united their efforts in creative brigades--for the solution of specific problems of production. An idea emerged: to place among the problems, which face the complexes, also the special-purpose training of personnel.

In the contract between the enterprises and institutes, which are the parties, they began to include a paragraph on the training of skilled scientific and engineering personnel for special design bureaus and enterprises. Under these conditions the chair of mathematical modeling could no longer train "abstract" graduates. It was necessary to train specialists, who know how to conduct goal-oriented basic research and are capable of broadening the outlet of science into practice. Already now the chair has also begun to conclude contracts on creative cooperation with oblast enterprises, scientific research institutes, and design bureaus. It is important to note that such contracts were concluded with the same partners, with whom the institute actively cooperated within the framework of interdepartmental scientific production associations. Precisely this, in our opinion, guaranteed the quality of the training of the young specialist. For at the stage of training, practical work, and the preparation of graduation projects the student participates in the introduction of the most advanced methods of science in production. The enterprise receives as a result a fine engineer who, as a rule, does not break off contact with science. These engineers take part in our seminars, write jointly with scientists scientific articles and applications for inventions, frequently enroll in correspondence graduate courses, and so forth.

Correspondent. But how do you feel about the numerous publications about the "needlessness" of dissertation works and about the fact that scientists have moved greatly away from engineers and "a distance of enormous size" has formed between them?

Ya.S. Podstrigach. I do not consider this to be correct. We do not have such a thing. For a genuine engineer is always still a scientist as well, while a good scientist, as a rule, is a fine engineer. This applies not only to experimental scientists, such as, for example, P.L. Kapitsa was. Practical experience has demonstrated, for example, that this applies to no less a degree to theoretical scientists. For example, our mathematicians looked into all the nuances of the production of picture tubes for color televisions and became active developers of new advanced technologies.

Such an approach to the matter in general is typical of the Ukrainian Academy of Sciences. In the area of mechanics Academician of the Ukrainian SSR Academy of Sciences A.N. Dinnik back in the 1920's posed the task to create an unprecedented type at those times of engineer-scientist, who understands practical questions very well and at the same time has a serious mathematical training. And he, Dinnik, a profound theorist who defended a dissertation on the theme "The Application of Bessel Functions to the Problems of the Theory of Elasticity," in 1921 organized at the Mining Institute in Yekaterinoslavl (now Dnepropetrovsk) a circle which united students, young engineers, and instructors. There was difficulty with fuel, everyone sat in overcoats and coats, but listened with enormous interest to the reports on specific

technical problems. The students of Dinnik tested on a unit, which they developed on their own, steel wire ropes and developed the latest brands of slag concrete for shafts. They substantiated theoretically and practically the replacement of crushed stone in concrete with open-hearth slag and so on. According to the recollections of the then students of Dinnik, a division into "pure" theorists and engineers did not exist among them. All were both good theorists and good engineers. Undoubtedly, Dinnik had an influence on the formation of the style of work of the Ukrainian School of Engineers, while his talented student, Academician of the Ukrainian SSR Academy of Sciences G.N. Savin, was the immediate founder of the school of mechanics in the western oblasts of the Ukrainian SSR. As you see, our present approach to the formation of highly skilled specialists has roots. What is the work yielding under the conditions of the obligatoriness of introduction? First, the student becomes an active participant in the production process. Second, the production workers surrounding him feel that a good theoretical base makes it possible to solve better everyday and long-range technological and design problems. They themselves also become familiar with science, become seekers of degrees, and defend dissertations.

Correspondent. That is, an ascent to one height--the engineer-scientist, whom the most complicated production urgently needs at the turn of the 2d millennium--is occurring.

Ya.S. Podstrigach. So that the opposition of the engineer to the scientist is illegitimate.

Correspondent. But how is it with the first link of the chain--the school?

Ya.S. Podstrigach. The fact that we have also directed attention to the school, once again is dictated by the attempt to shorten the time of the formation of the specialist. It is no secret: talented children do not always find their way. Frequently the question: "Where is one to enroll?" begins to occupy them in earnest during the last months of study at school and is settled in the end by their parents. How many fates of talented people, which did not take place, there are here! And as a result there is enormous harm to the national economy. Of course, definite work was performed in the direction of vocational orientation. For example, contests in mathematics, physics, and chemistry were held. But sporadically, unsystematically. Here in No 4 of TEKHNIKA I NAUKA for 1984 you yourself also wrote about the problem of the establishment of engineering clubs, in which it is also worth envisaging the special-purpose function of the development starting with the school years of engineering thought. But an organization, which will be able to assume the functions of a coordinator, is actually needed for this. In our case the Ukrainian SSR Academy of Sciences became such a coordinator. Precisely it built from the quite good forms of work with talented school children a system that is called the Small Academy of Sciences (MAN). I will not dwell in detail on its organizational structure. Here the main thing is the erasing of the sharp boundaries between the higher educational institution and the school in the unified system, within which the pupil is constantly connected to science, and the stages of his development are given and monitored by the system. But subsequently, when he has become a student, we work with him at the verge of the higher educational institution-production

system. The young person actively participates in the most usual life of the scientific collective under the supervision of one scientific associate or another. But school children, the members of the Small Academy of Sciences, also participate in exactly the same way in the work of the student collective of the higher educational institution, attend seminars, speak at scientific conferences, and have a permanent scientific supervisor, to whom it is possible to go at any time of the day, and frequently in the evening, in order to get advice on questions which worry the young "academician."

The successes of school children, who are members of the Small Academy of Sciences, in republic and all-union contests attests to the level of their training. One of them, A.L. Parnovskiy, even won an international contest in mathematics. I want to emphasize once again: all this is not cramming, when a month before the contest the grueling "coaching" of students begins. No! All the work within the Small Academy of Sciences is carried out systematically. The pupil has his own theme and an assignment, which is fulfilled in the course of a year and more, and is a member of the scientific circle. For example, the circle of mathematical topology with a 2-year program, in which adolescents study on the same level as 1st year students of the university under the supervision of young scientists--Candidates of Physical Mathematical Sciences I. Guran and M. Zarichnyy. For the seeking of active, talented children the Small Academy of Sciences jointly with sectorial scientific and technical societies forms field brigades made up of scientists and teachers. The members of these brigades give lectures and conduct interviews and seminars. Incidentally, the majority of our doctors and candidates of sciences participate in these trips. The Ukrainian SSR Academy of Sciences considers the work of the Small Academy of Sciences very important and necessary. That is why the well-known scientist, Academician of the Ukrainian SSR Academy of Sciences I.R. Yukhnovskiy, was appointed to the public post of president of the Small Academy of Sciences. The joint decree of the Secretariat of the Central Committee of Komsomol of the Ukraine, the Presidium of the Ukrainian SSR Academy of Sciences, and the Ukrainian Council of Scientific and Technical Societies "On Joint Measures on the Establishment and Development of Small Academies of Sciences of School Children Attached to the Scientific Centers of the Ukrainian SSR Academy of Sciences" was promulgated. It generalized the experience of the work of the Small Academy of Sciences and outlined the prospects of development.

So that the school child has the opportunity to independently find his position and to choose his own path: having enrolled in the corresponding higher educational institution, without vacillation and wavering to take part in scientific work with an orientation toward production.

Correspondent. But what is to be done with those who, let us say, have all the same not found themselves in scientific work?

Ya.S. Podstrigach. First of all, it is necessary to see to it that this would not happen. At our institute, for example, there is a long-range plan of the increase of the quality of work of the collective. It presumes a comprehensive detailed analysis of the age structure in the subdivision. We identify already in the 2d and 3d years of the higher educational institution the most capable students. It is easy to do this--they are constantly in our

sight and work, as was already said, on our scientific problems. But at times we see that the student has come to a standstill in development. In each specific case we ascertain the reasons and, if it is necessary to help, help.

Correspondent. And whoever cannot and does not want to work?

Ya.S. Podstrigach. We invite him, for example, to speak at a seminar, at which people of his own age will also deliver interesting works. After a good report a poor work lights up like a searchlight. This is a jolt. And a person either changes his style of work or makes some other constructive decision.

Correspondent. Once more about the last stage of the system--production. What role all the same does the academic institute play in the settlement of personnel questions at industrial enterprises?

Ya.S. Podstrigach. I have already said that the specialized chair of mathematical modeling of physical mechanical processes of Lvov State University exists at our institute. It has concluded contracts on creative cooperation with 12 organizations of the oblast. I will dwell in greater detail on one of them. In conformity with this contract the enterprise earmarked for students of the 3d and 4th years places for production practice, for students of the 5th year--places for graduation practice, and after graduation from the higher educational institution--a specific number of engineering places. During the 3 years, which the student will spend at one enterprise or another, he will take a deep look at the problems and will informally participate in the activity of the plant or design bureau, moreover, what is very important, under our constant scientific supervision. Among such partners of ours, which have concluded contracts on creative cooperation, are the Kineskop, Lvovkhmiselmash, Avtopogruzchik, and other production associations.

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MICROPROCESSORS, COMPUTER TECHNOLOGY IN S&T PROGRESS

Moscow TEKHNIKA I NAUKA in Russian No 2, Feb 86 pp 1-4

[Article by Professor V. Karibskiy, chairman of the Central Board of the Scientific and Technical Society of Instrument Making imeni Academician S. I. Vavilov: "For the Acceleration of Scientific and Technical Progress"]

[Text] The successful solution of the problems of increasing the efficiency of production on the basis of the extensive use of the achievements of scientific and technical progress is inseparably connected with the development of automation, microelectronics, computer technology, and instrument making. There is now no such area of the activity of man, in which the achievements of these directions of technology have not been used or should not have been used. Be it scientific research, production, agriculture, construction, or transportation.

The use of computer technology and microelectronics in systems of the automation of technological processes and various sectors of the national economy, in scientific research, in agroindustrial complexes, in microbiology, and in the machine building sectors is especially effective.

At present microprocessor and electronic computer technology is also being successfully used for the creation of computer-aided design and engineering systems (SAPR), which is yielding a significant technical and economic impact, shortens to one-fifth to one-half the time of the development of new items, designs, or technological processes, and increases the quality of developments.

Electronic computer technology holds a significant place in the sphere of management. As is known, the amounts of information, which originate in the sphere of management, are so great and are growing like an avalanche, that it is impossible to process it by conventional, traditional means and, consequently, it is also impossible in good time to elaborate and make correct decisions. The solution of this problem can be successfully achieved only by means of modern computers and microelectronics.

Specialists of various countries have determined more than 100,000 possible applications of microprocessor and electronic computer technology. Here the instances, when the use of microprocessors is technically and economically

justified, were taken into account. Now the area of the application of microprocessors already extends from space rockets to washing machines and children's toys.

Microprocessors and microcomputers have been engineered so that they can be directly incorporated in different kinds of equipment--technological units, instruments, machine tools, data transmission equipment, and test units. The incorporation of microprocessors and microcomputers in equipment implies the replacement of electronic, electromechanical, and mechanical blocks with general-purpose units, which ensure the operation of the equipment in accordance with an algorithm, which was developed in advance, and programs.

The technical improvement of technological processes and the development of new technologies, which is carried out on the basis of integrated and highly efficient automation, and the development of flexible machine systems, in turn, posed new, greater demands on products, both in the direction of the broadening of the range of instruments and in the increase of their technical characteristics, reliability of operation, and high quality of execution.

The discussion of these questions with the user sectors showed that about 40 percent of the instrument items--and first of all sensing equipment, instruments for the analysis of the quality of materials and media, recording and control elements, which are necessary for the development of automation systems--require modernization or replacement with new developments with increased indicators of reliability and technical parameters.

Such a situation is posing for the instrument making industry the tasks of the reform of the methods of work of scientific research institutes and design bureaus and the organization in a short time of the production of modernized and new instruments for the complete meeting of the need for them of the sectors of the national economy both with respect to the range and with respect to the technical characteristics and quality. The instrument making industry can solve this problem only on the basis of both the technical reorganization of scientific research and design and the organization of new technological processes. Here many specific instruments and means of automation of narrow application can be developed and produced by the instrument makers jointly with the users.

At the same time the task of the extensive introduction of microprocessor technology in instrument making itself was posed. It should be expected that the results of this systematic work will make it possible to increase sharply the technical level, reliability, and quality of instruments, automation equipment, and computer technology.

The qualitative changes in the organization of production, scientific research, and planning and design work are also advancing new demands on the scientific, technical, and organizational activity of the Scientific and Technical Society of Instrument Makers.

Active and specific work of the members and organizations of the society on the rapid introduction of scientific achievements in practice is required. Such work has been launched in the society.

The central board and local boards of the society are performing considerable work on the stimulation of the participation of specialists in the development of new instruments, automation equipment and control systems, and new technologies, which ensure a saving of material and manpower resources and the increase of the technical level, quality, and reliability of products; the possibility of their rapid assimilation and introduction; the increase of the efficiency of social production.

Here we are using the most diverse forms. As an example it is possible to cite the activity of the organizations of the Novosibirsk Oblast Board. The council of the primary organization of the scientific and technical council of NIISistem (Scientific Research Institute of Automated Planning and Management Systems) and is successfully carrying out the enlistment of the scientific and technical community in work on the increase of the efficiency of scientific research and its quickest introduction in production. Here the discussion by the members of the society of the assignments on new developments and participation in the work of the commissions for the determination of the technical level of developments have become the norm. The council of the scientific and technical society jointly with the trade union committee holds the competitions "For the Best Formulator of Problems" and "For the Best Programmer," which makes it possible to introduce annually up to 10 technological advances.

The economics section has performed a number of operations on the saving of expensive materials: for example, the introduction of a new technology of the production of compound polarizing prisms made it possible to decrease their cost to one-half. Members of the society took a direct part in the development and introduction of the computer-aided design system at the Novosibirsk Elektroagregat Plant, which made it possible to increase by sixfold the labor productivity of designers. The Quality and Reliability Automated Control System, which was introduced at the Plant imeni V.P. Chkalov, received a high rating of specialists. The system makes it possible to shorten drastically the time for the processing of the information on the quality and reliability of the output being produced. While 2 years ago the council of the scientific and technical society set up public control over the development and introduction of 40 plant management automation systems, plant technical management automation systems, and computer-aided design systems, the economic impact from the introduction of which came to more than 13 million rubles.

The members of the society are actively participating both in the development of new technical solutions and inventions and in the introduction of ones which have been patented within the country and abroad. For example, in the 1960's a technology of producing planar foil resistor circuits (FRS) in integrated design, which made it possible to develop a family of high-precision electrical measuring instruments, was developed in the USSR. At present, however, these circuits no longer meet the present requirements of science and technology. When developing the new generation it was necessary to achieve the assurance of the further improvement of the metrological characteristics; the increase of the resistance to the effect of climatic factors; the decrease of the dimensions and weight of the circuits; the sharp

decrease of the labor intensiveness by means of the automation of their production and checking; the decrease of the consumption of materials and the increase of the ecological cleanness of technological processes.

The section of electrical measuring instruments of the Krasnodarskiy ZIP Production Association and the section of microelectronics of the Krasnodar Kray Board took a direct part in the solution of all the indicated problems. The entire course of the development of the new technology was discussed at meetings of the section, and then the correctness of the elaborated recommendations was checked in the laboratory.

A fundamentally new technology and design of glass ceramic foil resistor circuits based on ultrafine metal strips and glass ceramics were developed as a result. The technology is based on the use of modern laser, computer, and photolithographic technology. The basic operations are completely automated, which guarantees a relatively simple, quick, and inexpensive method of the industrial production of ultraprecision resistors and resistor circuits with unsurpassed accuracy and long-term resistance stability--Ø.ØØØ5 percent a year in case of significant electric loads. This exceeds by ten- to twentyfold the stability of the best foreign examples.

The participation of the councils of the scientific and technical society in the activity of the production engineering and technical and economic councils of enterprises is affording great possibilities for the acceleration of the introduction of the proposals of the scientific and technical community.

Participation in the elaboration of the scientific and technical directions in the area of the automation of technological processes and the development of robotic means, flexible machine systems, and computer-aided design systems holds a significant place in the work of the scientific and technical society.

These questions were repeatedly examined at scientific and technical conferences, seminars, symposiums, and schools of advanced know-how, which made it possible to make a significant contribution to the elaboration of the scientific principles of the development of the most effective systems on the basis of the extensive use in them of microelectronics and computer technology.

The extensive introduction of microelectronics and computer technology, as well as automated systems, which were formed on their basis, posed the important and urgent task of the training of personnel and the increase of the skills of the engineering and technical personnel, who are employed in the sphere of the operation of automated control systems and the series maintenance of the hardware which is included in these systems.

However, a number of difficulties, which are checking the more extensive introduction of microprocessors, exist. The first is the lack of software in the necessary volume and range. The point is that the development of software in our country is poorly organized. A large number of different organizations of ministries and departments and subdivisions at higher educational institutions are concerned with this. However, their work in most cases is of a special nature and is aimed at the solution of some specific problems or

others, which arise in these organizations (I am excluding specialized organizations). But in the plans of the new five-year plan a sharp increase of the production of computer hardware is envisaged. And if software is not produced, this hardware cannot be used efficiently. Therefore, the organization of work on the development of software is one of the most important tasks of the scientific and technical community.

The second thing is the lack of preparation of the users for the use of computer hardware.

It is difficult to overestimate the role and possibilities of scientific and technical societies in the questions of the preparation of users for the acceptance and efficient use of computer hardware in their practical activity and the establishment of the mutual understanding of the producers and users, that is, in the training of personnel for the purpose of eliminating what is called "computer illiteracy."

We have the opportunity to hold seminars, schools, and practical lessons at houses of technology and correspondence institutes for the improvement of skills, as well as directly at the enterprises, which are the producers of computer hardware, and at the enterprises which use it in their practical activity.

It seems to us that the training of personnel is now differentiated as follows.

The training of systems engineering specialists in the use of computer hardware and the development of so-called applied programs. Mainly the higher school is engaged in this.

The next group is the users--engineering and technical personnel, whom it is necessary to help in the mastering of computer hardware and its use. Here the extensive network of courses, schools, seminars, and correspondence institutes--both of the higher school and departments and of organizations of the scientific and technical societies--can be used here.

And, finally, the third group is instructors of tekhnikums, vocational and technical schools, and schools. The same network as for the improvement of skills can serve as the base for their training. The training of students of secondary schools, vocational and technical schools, and tekhnikums is being organized in the statewide system of education.

In the questions of the use of computer hardware in the national economy and the increase of the skills of engineering and technical personnel the Scientific and Technical Society of Instrument Making is performing systematic work and is constantly seeking new forms of its performance. Here I want to note the activity of the Correspondence Institute of the Central Board, in which they have developed a syllabus for the course "Microprocessors and Microcomputers." In accordance with this syllabus the course of the instruction of engineering and technical personnel was organized and the series of lectures "Microprocessors and Microcomputers" was published. More

than 2,500 specialists from various sectors of the national economy have taken this course.

In 1986-1987 the institute proposes to organize a second course for the improvement of the skills of engineering and technical personnel, "Microprocessors and Microcomputers," in the lectures of which, in particular, questions of the use of microprocessors and microcomputers in various fields of science and technology, industry, and the nonindustrial sphere will be covered.

An important direction in the work of the scientific and technical society is the enlistment of the engineering and technical community in the carrying out of the certification of workplaces and the elaboration of proposals on the mechanization and automation of individual manual operations, what is called "small-scale mechanization and automation."

The work of the scientific and technical society in this direction, which was performed under the supervision of the Orel Oblast Party Organization, yielded positive results. At the instrument making plants a list of manual operations, which are to be changed over to mechanized and automated operations, was drawn up, a plan of the development and sale of attachments, mechanisms, and devices, which replace manual labor, was drafted, the deadlines of the introduction of these developments were established, and the performers were specified. Here it turned out that the majority of operations can be performed by the forces of the engineers and workers of the plants and by means of the resources of the enterprises themselves, without any additional capital investments.

Several proposals required the participation of specialized design bureaus and organizations. In all more than 1,500 members of the Scientific and Technical Society of Instrument Making were enlisted in this work.

There is no doubt that the further active work of scientists, engineering and technical personnel, worker-innovators, and members of the scientific and technical society of instrument makers will make it possible to solve successfully the problems of increasing the economic potential of the national economy on the basis of the extensive and rapid introduction in practice of the achievements of science and technology.

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REGISTRATION OF RESEARCH AT KAZAKH ACADEMIC INSTITUTE

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 3, Mar 86 pp 23-24

[Article by Candidates of Chemical Sciences Sh.Ye. Ismailova and G.M. Dzhilkibayeva under the rubric "The Efficiency and Quality of Scientific Research": "On the Official Registration and Recording of Scientific Research Work at the Academic Institute"]

[Text] The formulation of comprehensive goal programs, in the fulfillment of which along with academic institutes various sectorial institutes, ministries, and enterprises take part, is one of the means of solving important national economic problems. This is having the result that the information on such scientific developments is acquiring an intersectorial nature, which creates the prerequisites for its dispersal in publications of the general type. Such materials are not easily accessible, and it is possible to obtain the most complete information on them by studying the information sources of the All-Union Scientific and Technical [Information] Center (VNTITsentr).

The All-Union Scientific and Technical Information Center is the basic unit in the state scientific and technical information system, on which the duty has been placed to register the research and development being conducted in the country.

The procedure of the recording of new themes and the submitting of reports on completed developments at the All-Union Scientific and Technical Information Center are specified by a number of decrees of the USSR State Committee for Science and Technology.

For the institutes of the Kazakh SSR Academy of Sciences the corresponding decrees and orders, which are adopted by the Presidium of the Kazakh SSR Academy of Sciences, are of particular importance.

For the purpose of ensuring the uniformity of the content and form of the information being submitted for the registration of works at the All-Union Scientific and Technical Information Center new standard forms of registration cards (RK) and information cards (IK) in conformity with All-Union State Standard 7.32-81 "The Report on Scientific Research Work" and methods manuals on the making up of the reports being submitted, the registration cards, and the information cards were established as of 1982.

A number of measures on the introduction of the new all-union state standards were implemented at the Order of Labor Red Banner Institute of Chemical Sciences of the Kazakh SSR Academy of Sciences. Thus, first of all the staff members of the patent information department (PIO), who studied in detail all the materials on the registration of scientific research work and the making up of reports, registration cards, and information cards, were familiarized with the new forms and procedural recommendations. At the second stage all the chiefs of laboratories and senior scientific associates and the responsible executives for scientific research work were familiarized with the new all-union state standards. One copy each of the all-union state standard on the making up of the report on scientific research work was turned over to each laboratory. At the third stage the introduction of the new all-union state standards is legalized by an order of the director of the institute, and after this they become mandatory when fulfilling scientific research themes.

The monitoring of the observance of the proper making up of reports, registration cards, and information cards is carried out by the patent information department of the institute. At the beginning of the year at the stage of the annual current planning of the scientific research work of the institute the registration cards on continuing themes are checked. The new developments, which are to be registered, are identified, and registration cards, which are sent to the All-Union Scientific and Technical Information Center, are drawn up jointly with the developers.

A file of the cards that have undergone state registration at the All-Union Scientific and Technical Information Center, which is formed by years of the completion of scientific research work and subject to the nature of financing, is kept in the department. A general list of the scientific research work being performed at the institute, which is sent without fail to the republic scientific and technical information organ, the Kazakh Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research, is drawn up annually on the basis of this card file.

The registration cards on the scientific research work, which is being completed during the current year, are taken under special control. After the approval of the reports of the laboratories in the Scientific Council, which have been drawn up in conformity with All-Union State Standard 7.32-81, the reports on the completed themes with the information cards are sent within a month's time to the All-Union Scientific and Technical Information Center.

The practical experience of the institute shows that in some cases the effect of economic contractual themes is extended by 1-2 years, at times a theme is removed from state registration in connection with the curtailment of financing by the client of the given development. Thus, in 1983 at the institute three developments, which had been performed in accordance with economic contracts, were halted and the term of six scientific research works was extended. In these cases a special form on the changes of the term of the conducting and financing of scientific research work, which is sent to the All-Union Scientific and Technical Information Center, is drawn up.

With allowance made for all the changes, which have occurred in the themes of the institute during the year, at its end a complete list of the scientific research work for the institute is drawn up and sent by the patent information department to the Kazakh Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research with an indication of the inventory numbers for the completed themes.

The availability of a general list of the scientific research developments, both budget-carried and economic contractual, which are being carried out at the institute, facilitates the drawing up of assignments and the elaboration of regulations of the conducting of patent research on them in conformity with All-Union State Standard 15.0I-82.

In recent years at the institute the level of the registration of scientific research work at the All-Union Scientific and Technical Information Center has increased significantly, the quality of the reporting documents being submitted on it has improved.

The used form of the accounting of the recording and official registration of scientific research work at the Institute of Chemical Sciences of the Kazakh SSR Academy of Sciences makes it possible to check in good time and visually the stage-by-stage fulfillment of scientific research developments, which, in turn, affects the efficiency and quality of the information materials being submitted to the All-Union Scientific and Technical Information Center.

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BIOTECHNOLOGY LABORATORY OF TBILISI UNIVERSITY

Moscow IZVESTIYA in Russian 27 Mar 86 p 2

[Article by IZVESTIYA correspondent T. Chanturiya under the rubric "Get to Work!" (Georgian SSR): "The Locomotive for the Idea. A New Mechanism of the Introduction of Scientific Developments Is Being Used Successfully in Georgia"]

[Text] The archives, in which unintroduced scientific ideas are stored, probably stretch somewhere.

If one were to take a look, the names of the participants in our story would probably also be found in those warehouses.

And here the very same candidates, meneesy [sic], and laboratory workers are now showing themselves to be the motive forces of science. Joking aside. Now they are working only for the result. While the result is working for them. In references they have ceased to use the words "talented," "conscientious," "dedicated." But they directly indicate: he did that, developed this, achieved such-and-such a result.... Terrible rationalists.

What happened to them? A change of attitude occurred: with the founding of the laboratory at it, as an experiment, such a system of the organization and remuneration of the labor of scientists and such a mechanism of the relations with the client, in which there is one commander in chief--the end result--have been in effect. Therefore, it is necessary to begin from this end--from the result.

In the 3 years of the existence at the Chair of Biochemistry of Tbilisi University of the biotechnology laboratory (the scientific supervisor is N. Aleksidze, the chief of the laboratory is T. Mdinaradze) 12 certificates of authorship for inventions have been received. The documents for 14 types of new products (made from the waste products of agricultural production) have been prepared and approved. Of them 10 types have been and are being introduced.

Among other things a system of waste-free production for large hog raising complexes was developed from the idea to the technology. The system has been tested and introduced.

At the Krtsanisi Hog Raising Complex there are now 18,000 head, but there will be 24,000. It is already now producing in a year 40,000 tons, pardon the prosaic expression, of manure. Nature has been coping for a long time by natural means with these waste products, with considerable harm for itself. The industrial production of pork is multiplying the settling tanks. And they are already checking production (there are countries, in which it is being curtailed for this reason). In general, the problem is quite difficult.

What did the Georgian scientists do? They developed a simple technology of recovering waste products with their subsequent use. It is efficient, while it can manage with quite simple equipment. The range of the use of the processed waste products is very broad. These are fodder additives, a filler in the production of thermosetting plastics, and fertilizers.

G. Bochorishvili, director of the plastics plant, likes the properties of the new material for plastics. While T. Chrelashvili, director of the hog raising complex, is using extensively the fodder additives made from waste products and regards them as "a new fodder." Now they are amazed themselves at the fact that literally yesterday the idea of using precisely these waste products seemed utopian to them.

In Krtsanisi they conducted an extensive series of experiments on fodder additives. The results are very good. The additional weight gain of the animals as compared with the control animals came to 12-15 percent. By means of the new additives it is possible to save a fourth of the basic fodder. There is an economic impact of 40,000 rubles per 1,000 hogs.

This impact created a great impression on T. Chrelashvili, director of the hog raising complex. It should be introduced in practice at large! The republic State Agroindustrial Committee as the basic client is ready to purchase the necessary equipment. But so far there is no conclusion of the Pharmacology Council attached to the Main Administration of Veterinary Science of the USSR State Agroindustrial Committee. How long is one to wait for it? It is not clear. Hence, that is the snag: these two trains are running under too different conditions. The train of the experiment is an express train.

What makes it such?

"A successful scientific idea is rush cargo. A powerful engine and a reasonable schedule should deliver it to the destination without delays. In other words, material stimuli and the organization of work, which is free of obsolete, far-fetched restrictions...."

Who do you think said this? Republic Minister of Finance D. Dvalishvili. He developed the mechanism of introduction.

Why him? Or does the Ministry of Finance not have other concerns, besides how to develop science? It does. But the end result of this development is a state advantage, the increase of the state budget. The minister, in taking

trouble about the "locomotive for the idea," is performing his correctly understood official duty.

In the Georgian State Agroindustrial Committee they understood their duty in exactly the same way. In the development they saw what, perhaps, the authors also did not see. They decided: to introduce their idea according to the usual, slow schedule--to lose both the economic impact and, perhaps, priority. It is necessary to create special conditions for introduction. The Ministry of Finance was linked up here, the idea of the experiment originated--a locomotive was coupled to the idea.

The laboratory is an independent cost accounting unit attached to the chair. It organizes work in accordance with economic contracts. It is financed by the client from the anticipated annual economic impact. It also determines the amount of the wage fund. It is a matter, however, not of the absolute amount. Assume for a person a fixed salary, well, all right, even 500 rubles--he gets accustomed to it, and the stimulus is no longer the same. At the laboratory it is possible, in addition to the monthly salary (it corresponds here to the prevailing schedules), during the year to receive as bonuses 4, 7, and even 11 (!) salaries--as, for example, G. Supatashvili received, when he brought the polymer molding compound with the use of waste products up to industrial introduction. But it is also possible not to receive this addition at all. It is how you work. At the end of the month the scientific and technical council of the laboratory evaluates the labor of everyone and makes a decision on the amounts of the bonuses.

But from where, one would like to know, does such a possibility of giving incentives come? For there is not a ruble for this in and above the wage fund. But the right has been given instead, say, of 20 performers to include in the theme 15, instead of 10--5. And to preserve the saved wage fund for the laboratory. Of course, it is not always possible to perform the work with a smaller number of people. Then they change the composition of the group and seek its optimum version. They decided to do away with the permanent departments and left small problem groups. It is simpler to reorganize them. And the responsibility for the result rests more uniformly on people. It is not as in the case of rigid attachment for years, when some pull and others ride.

The problem groups strive to perform the work before the contractual deadline. The point is that the wage fund, according to the statute, is retained over the entire period. With this money N. Aleksidze is now, for example, conducting "exploratory" research. Scientists ordered its theme for themselves. A promising turn emerged, it was necessary to check it. They invited a good microbiologist from the Institute of Plant Biochemistry. That is why they did not undertake the theme themselves--a high-class specialist is needed. It is a guarantee of the quickness and good level of fulfillment.

The laboratory generates ideas, and then seeks means to shorten the time of their elaboration and selects the most effective ones. It brings in highly skilled specialists. During the period of work it pays them a salary in accordance with the usual scale, and makes a final settlement upon completion.

That is the kind of rationalists they are. Among production workers they evoke almost tenderness.

"We have happy relations," G. Bochorishvili, director of the plastics plant, said to me. "When we were building on the steppe the plant for the production of plastics, we lived like the first workers in the virgin lands. And there were no such 'this-is-not-my-duty-do-it-yourself.'"

Production for scientists is a magnet: all the organization of the work of the laboratory is turning its pointers toward it. Experienced workers have also begun to work after the example of the scientists. It was necessary to build at the hog raising complex an experimental shop and to produce at it new fodder additives. The laboratory concluded a contract with the chief of the local fodder shop. They offered him in addition the salary of an engineer (and a bonus upon completion). He used all conceivable means and every idle piece of iron, and in a few weeks they put the shop into operation at full capacity. If the laboratory had turned to a design institute and an installation organization, the matter would have dragged out for a year, and it would have cost about 10,000 rubles. But here it costs 2,500 rubles.

The same mutual understanding exists at other facilities of introduction--at the Gamardzhvebskiy Poultry Factory and the Tbilmoloko Association. And the same obvious results of joint work with scientists.

We have not yet said the main thing. That with the completion of introduction in the course of 3 years the works assigns to scientists 30 percent of the profit. Thirty. For this is close to the self-sufficiency of the laboratory, in no longer only applied, but also basic operations. The experiment has already today also made it possible to build up the material base of the entire chair, of which, incidentally, the same N. Aleksidze was and remains the chief.

"The impression is being created," N. Aleksidze said during the discussion of the experiment in the republic Coordinating Council for Science and Scientific and Technical Progress, "that we are opposed to the actually prevailing economic conditions. If it were not for this, we could have achieved more."

What is he talking about? They did not receive, in violation of the contract, the wage fund from the Ministry of the Meat and Dairy Industry. Indeed, for all the obvious interest of the client the latter was unable to justify in the eyes of the union management of the sector the reasonability of the nonstandard decision. But now this ministry has already become a part of the State Agroindustrial Committee, and the laboratory has a mutual understanding with it. Is that all? No, it is not all. Tomorrow they might be faced with a similar problem in another union or union republic department.

The statute on the experiment frees scientists as much as possible from petty guardianship. In practice the decision on the crediting of bonuses had to be stamped by seven people, the order on it had to be stamped by another eight. They hired on a "job basis," when it was necessary, Moscow specialists, they did the work remarkably quickly and well, but the accounting office refused to pay them: "We were not told anything about people from another city."

Another important condition is not being completely fulfilled--concerning the fact that the assets of the material incentive fund, which have been saved by the end of the year, and others should be retained by the laboratory. This is the main thing: the good work is providing new possibilities for the conducting of resourceful and basic research.

Today there are these questions, tomorrow others may appear.

"It is a strange thing," the Minister of Finance said at the same discussion. "When scientific and technical progress was skidding, many people tried to justify themselves by the fact that their hands were tied by the prevailing instructions and standards. But when they lift these restrictions, the same people simply reach for the instructions which they previously cursed."

One will not put a spoke in the wheel of the biotechnological laboratory given the support which it enjoys in the republic. But we need not one such laboratory, yet was is worthwhile to begin otherwise?

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SESSION OF GENERAL ASSEMBLY OF LITHUANIAN ACADEMY OF SCIENCES

Vilnius SOVETSKAYA LITVA in Russian 12 Mar 86 pp 1, 3

[Article: "The Urgent Tasks of Science"]

[Text] Vilnius, 11 Mar (ELTA)--The session of the General Assembly of the Lithuanian SSR Academy of Sciences to hear reports and elect new officials, which was held today, discussed the works of scientists of the republic, which were completed in 1985, as well as the accomplishment of the tasks which were posed by the 27th CPSU Congress for the workers of science.

Academician Yu. Pozhela, president of the academy and a delegate of the 27th CPSU Congress, opened the session. He noted that the acceleration of the economic and social development of the country in our times is becoming a law for communists and for all the Soviet people. The main means of accelerating economic and social development is scientific and technical progress, of which the latest discoveries in the field of atomic energy, information science and computer technology, biotechnology and gene engineering, robotization, the use of electronics, and the basic sciences constitute the basis.

Academician K. Meshkauskas, chief scientific secretary of its presidium, delivered the report on the scientific and organizational activity of the academy. A. Shileyka, deputy academician secretary of the Physical, Technical and Mathematical Sciences Department, V. Kontrimavichyus, academician secretary of the Chemical, Technological, and Biological Sciences Department, and I. Matsyavichyus, academician secretary of the Social Sciences Department, gave synopses of the plans of scientific research for 1986.

It was noted that the scientists of the republic intend to step up their activity substantially, to develop basic science rapidly, and to increase the quality and effectiveness of its research. Much has to be done on the improvement of the system of the planning and coordination of basic research. Here the problem councils have the decisive say. On the basis of the system of scientific information they should outline the most effective directions of their scientific fields, recommend to the scientific organizations and higher educational institutions of the republic the themes of basic research, come forth, where this is necessary, with suggestions on the cooperation of the scientific subdivisions of various departments, and actively participate in the certification of scientific works of all departments of the republic. The most important factor of the intensification of scientific research is the

speeding up of the fulfillment of scientific research and the increase of its quality. Here the formation of groups of workers of different specialties and the cooperation of the experimental base are coming to the forefront. It is possible to achieve all this only by the elimination of departmental barriers and the granting to the management of institutes of greater independence when forming the structure of departments, which conforms to the plans of work. It is advisable to form temporary interinstitute and interdepartmental collectives for the solution of specific problems which require the cooperation of scientific forces.

Considerable experience in the organization of cooperation between academic institutes and industrial enterprises has been gained in the republic. Practical experience shows that it is possible to achieve success in this area only when not measures, but specific end results are planned.

During the 12th Five-Year Plan much attention will be devoted to the questions of the development of electronic engineering and computer technology and their introduction in the national economy. In production and planning and design developments it is planned to introduce extensively the methods of mathematical modeling and the numerical experiment. In industry, biology, and medicine laser technology will be introduced on a broad scale, the amounts of scientific development in machine building will be increased significantly. It is necessary to use better the results of scientific developments for the intensification of animal husbandry and plant growing, the improvement of nature conservation, and health protection. Economists of the republic will solve the urgent problems of the intensification of the national economy and science.

Secretary of the Lithuanian CP Central Committee L. Shepetis spoke at the session. S. Imbrasas, chief of the Science and Educational Institutions Department of the Lithuanian CP Central Committee, and other responsible officials of the republic took part in it.

Yu. Pozhela was reelected president of the Lithuanian SSR Academy of Sciences, A. Zhukauskas and V. Stalulyavichyus were reelected vice presidents, E. Vilkas was reelected chief scientific secretary of the presidium, there were elected the academician secretaries of the departments: the Physical Technical and Mathematical Sciences Department--A. Shileyka, the Chemical, Technological, and Biological Sciences Department--V. Kontrimavichyus, the Social Sciences Department--I. Matsyavichyus. All of them, as well as L. Kayryukshtis, I. Kubilyus, I. Lankutis, Yu. Matulis, and A. Merkis were elected members of the presidium of the academy.

There were approved as directors of the institutes: the Institute of Mathematics and Cybernetics--V. Stalulyavichyus, the Institute of Physics--Z. Rudzikas, the Institute of Physical and Technical Problems of Energetics--Yu. Vilemas, the Institute of Chemistry and Chemical Technology--R. Vishomirskis, the Institute of Biochemistry--Yu. Kulis, the Institute of Botany--A. Merkis, and the Institute of History--B. Vaytkyavichyus.

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BIOGRAPHICAL INFORMATION

SAMSON SEMENOVICH KUTATELADZE OBITUARY

Moscow IZVESTIYA in Russian 23 Mar 86 p 6

[Article: "Academician Samson Semenovich Kutateladze"]

[Text] Soviet science has suffered a grave loss. On 20 March 1986 Academician Samson Semenovich Kutateladze, a CPSU member since 1943, an outstanding Soviet scientist in the field of power engineering, thermal physics, and physical aerohydrodynamics, a prominent organizer of science, a member of the Presidium of the Siberian Department of the USSR Academy of Sciences, director of the Institute of Thermal Physics of the Siberian Department of the USSR Academy of Sciences, Hero of Socialist Labor, and USSR State Prize winner, died.

S.S. Kutateladze was born on 18 July 1914 in Leningrad. He graduated from the Leningrad Industrial Institute in 1950. From 1932 to 1958 he worked at the Central Institute of Boiler Turbines, where he covered the path from laboratory worker to chief of a department. S.S. Kutateladze participated in the Great Patriotic War and was wounded. He joined the ranks of the CPSU on the Karelian Front.

After 1958 S.S. Kutateladze worked at the Siberian Department of the USSR Academy of Sciences, where he became one of its organizers.

Basic achievements in the field of the hydrodynamics of gas-fluid flows, the aerohydrodynamics of turbulent flows, and heat transfer in case of boiling and condensation, which brought him world fame, are connected with the name of S.S. Kutateladze.

The development of the theory of burnout made it possible to solve many difficult problems of the design of high-power nuclear and conventional power plants.

S.S. Kutateladze performed for the first time in the USSR research on liquid-metal heat transfer agents; he developed a new approach to the calculation of turbulent flows of gas at high speeds.

S.S. Kutateladze and the students of his school always cooperated most closely with industry in the development of equipment of new power and transportation engineering.

For outstanding scientific achievements in 1968 he was elected a corresponding member of the USSR Academy of Sciences, and in 1979 a full member of the USSR Academy of Sciences.

S.S. Kutateladze established a large scientific school. The awarding to him of the Max Jakob Prize and his election to the assembly of international conferences on heat and mass exchange were international recognition of his services.

He was the recognized leader of Soviet thermal physics, a member of the editorial boards of many Soviet and international journals, and chairman of a number of scientific councils. S.S. Kutateladze took an active part in the sociopolitical life of the country.

S.S. Kutateladze did much pedagogical work at Novosibirsk State University.

The services of Academician S.S. Kutateladze were appreciated by the Communist Party and the Soviet state. He was awarded the lofty title of Hero of Socialist Labor and was awarded three Orders of Lenin, the Order of the October Revolution, the Order of Labor Red Banner, the Order of the Patriotic War, the Badge of Honor, and medals; the USSR State Prize was awarded to him.

The blessed memory of Samson Semenovich Kutateladze, a remarkable scientist, a communist, and a person who devoted his life to the service of the country, will remain forever in the memory of the Soviet people.

[Signed] The USSR Academy of Sciences; the Siberian Department of the USSR Academy of Sciences; the Power Engineering Department of the USSR Academy of Sciences.

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